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ABSTRACT

Oklahoma Ag in the Classroom is a program of the Oklahoma Department of Agriculture and the Cooperative Extension Service that aims at providing educators with opportunities to help youth understand the importance of agriculture in everyday life. This book includes a collection of ready-to-use teacher guides and activity sheets that can be used to integrate agriculture into school subjects in such a way that students become "ag-literate" while learning language arts, reading, information skills, mathematics, science, social studies, and visual arts. The lessons in this book, targeted at grades 3-4, are designed to supplement existing curricula and are arranged by subject matter area. Lessons are arranged by level of difficulty within each subject area. Teacher guides include the following: subject, agricultural topic, student skill, learner objective, grade, concept, step-by-step instructions, background, resources, evaluation, and related activities. A glossary, pattern pages, suggestions for requesting assistance, writing pages, and resource lists are included. (JRH)

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OKLAHOMA

AG IN THE CLASSROOM

3-4

ED 401 101

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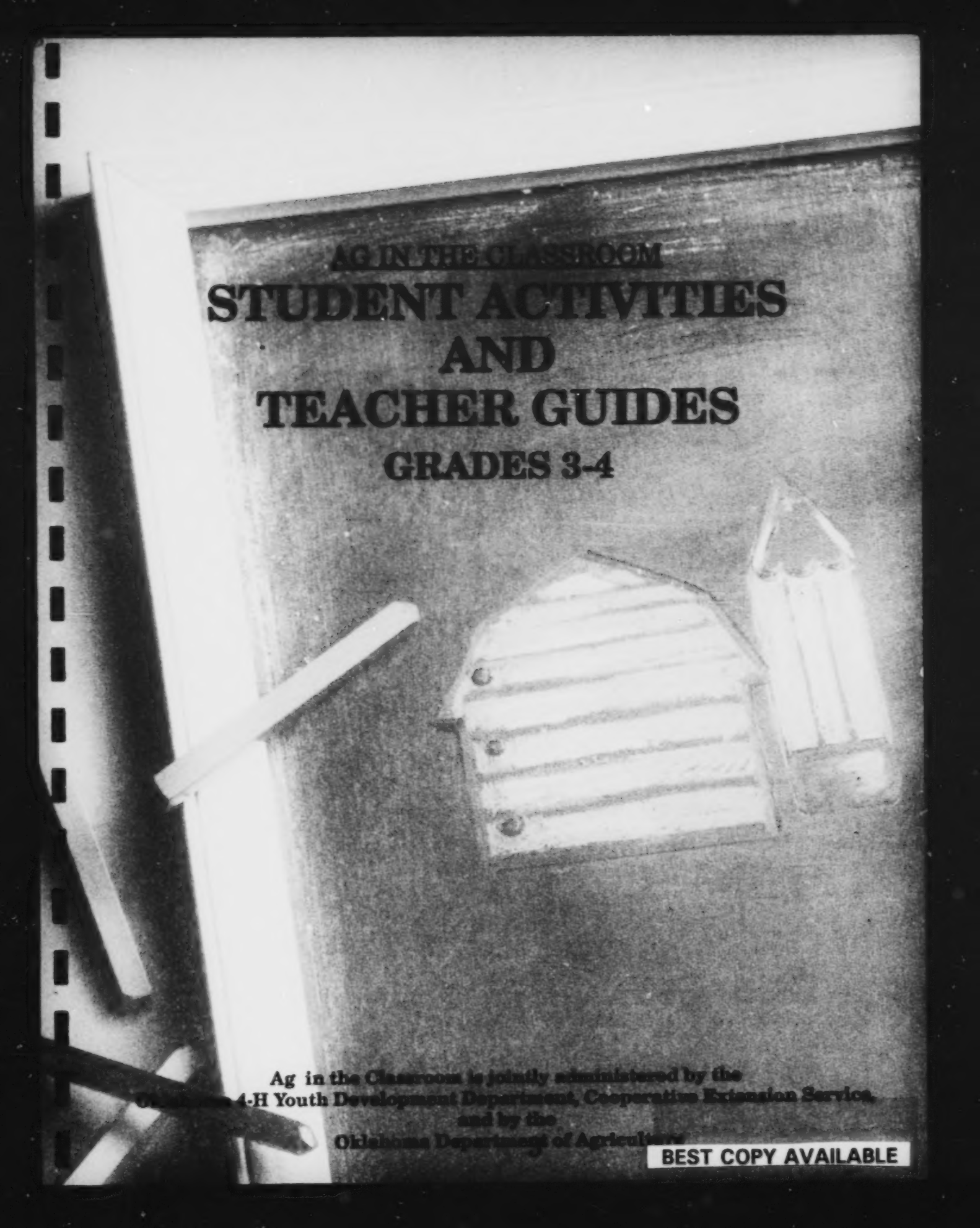

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Oklahoma Ag in the Classroom
205 Poultry Science Building
Oklahoma State University
Stillwater, OK 74078

The cost per 3-4 curriculum guide for orders placed before June 30, 1995, will be $10. After that date check with the same address, or call (405)744-8887 for current prices.

Student worksheets may be reproduced for educational use.

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- Oklahoma Department of Agriculture
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Preface

Oklahoma Ag in the Classroom offers you, the educator, an opportunity to help youth understand the importance of agriculture in all our daily lives. We all understand the importance of having food on our tables and clothes on our backs, but how many of us really understand the essential food and fiber industries in Oklahoma and the United States?

This book includes a collection of ready-to-use teacher guides and activity sheets that will integrate agriculture into school subjects in such a way that students will become "ag-literate" while learning language arts, reading, information skills, mathematics, science, social studies and visual arts.

Why agricultural literacy for all students?

Only a few generations ago, nearly everyone was involved in agriculture. In many cases, the whole family—men, women and children—worked on the family farm or ranch. Even in recent times, youth who lived in cities had grandparents or other relatives who still lived on the farm or had rural ties. Today less than 3 percent of the population is directly involved in agricultural production. Fewer and fewer Americans are tied to the land, and fewer and fewer students are pursuing agricultural careers.

For this reason, too many people today have no idea how their food gets on the table, even though all of us still depend on the land for survival. Agriculture is the most basic and essential enterprise of our society. It is agriculture that converts natural resources—soil, water, air, sunlight and minerals—into the foods that nourish us and keep us healthy. If we manage these resources properly they will sustain us forever.

Few Oklahomans are aware of the role agriculture plays in our state's economy. In Oklahoma, we have 32 million acres in agricultural production. Twenty-seven percent of our state's work force is involved in employment related to agricultural production, processing or marketing. Agriculture is important to every citizen in Oklahoma because it is as essential to our fiscal health as it is to our physical health.

The efficiency of American agriculture gives us most of the luxuries we enjoy. Although less than 3 percent of the population is directly involved in agricultural production, American farmers account for over 7 percent of the nation's productivity, making them the most productive segment of the American work force. Farmers provide the safe and economical food supply that allows the other 97 percent to concentrate on the other important enterprises. These enterprises—medicine, computer and information technology, space exploration and industrial technology and production—are the ones that make us world leaders.

Tomorrow's citizens, consumers, business leaders, legislators and educators must be agriculturally literate in order to protect and preserve the advantages we gain from a strong agriculture. Even though most of our citizens will continue to live in cities, all of us will continue to depend on agriculture for the most essential things in our lives. Building that essential literacy is the purpose of *Oklahoma Ag in the Classroom.*

Organization of Materials

The *Oklahoma Ag in the Classroom* lessons are designed to supplement existing curricula. In this guide they are arranged by subject matter area. Within each subject area the lessons are arranged by level of difficulty. The lessons that cover the complete grade level range within a subject are listed first, followed by those appropriate for specific grade levels. A glossary, pattern pages and resource lists are included in the back of the book. In addition, the lessons are indexed by agricultural topic, agricultural concept, grade level and lesson title.

Many of the lessons are supported by **student worksheets.** Instructions for their use are included in the lesson section of the teacher guides.

Teacher guides follow a format similar to the one presented below.

LESSON TITLE

Lessons are numbered according to subject, for easy reference. M9 is the ninth math lesson in the book. M9

SUBJECT: Major subject the lesson is designed to teach. Many of the lessons are interdisciplinary.

GRADE: Approximate grade level. Lessons are easily adapted for use at higher or lower levels.

AGRICULTURAL TOPIC: The agricultural specialty from which the background material was drawn.

CONCEPT: Six primary concepts form the backbone of the *Ag in the Classroom* curriculum. Concepts are listed in the back of the book.

STUDENT SKILL

Each lesson is designed to teach one or more of the skills recommended for this grade level by the Oklahoma State Department of Education.

LEARNER OBJECTIVE

This summarizes the specific Oklahoma agricultural information the lesson was designed to teach.

LESSON

A. Step-by-Step Instructions

The activity is presented simply, one step at a time.

B. Background

General information is written in simple language, for easy use in the classroom. The information is validated by specialists in OSU's Division of Agricultural Sciences and Natural Resources. The specific academic department from which the material was drawn is listed at the end of the background material.

C. Resources

Books

This is a list of books currently in print which relate to the subject matter presented in the lesson.

Additional Resources

This list includes materials the teacher can order from various sources at little or no cost. The list is not intended to be all-inclusive. When considering resources, don't overlook local resources, like your county Extension office, farm groups, commodity groups, agribusiness and agricultural educators.

D. Evaluation

This section lists some considerations for evaluating the effectiveness of the lesson. The evaluation is not always a written evaluation. It may be based upon teacher observation or learner participation.

E. Related Activities

These activities are suggestions for helping the teacher extend and broaden the learning experience.

How to Respond

Please let us know what you think of the *Oklahoma Ag in the Classroom* program by sending us your written comments at least yearly. You may do this as individual teacher or as part of a group of teachers in your school.

We would like to know which lessons work well and which ones don't work so well in your classroom. We would like to know if the lessons are appropriate for the grade level you teach, if the lessons are effective in helping reach the assigned learner competencies and if the background is helpful.

We would also like to hear from you regarding other lessons that might be added to the series in the future. In other words, if you have created other ag-related lessons or if you have added related activities to a lesson, we ask that you share that information so we can pass it along to others.

For reporting purposes, we would also like to know how many students were served by *Oklahoma Ag in the Classroom* in your school setting.

This program is facilitated locally by your county's OSU Cooperative Extension Service staff and volunteer facilitators that represent various agricultural and natural resource interests in your area. You may also be asked by this group to assist in local program evaluation. Your cooperation and response will help to assure the long term success of this educational effort.

To contact a program facilitator in your area, contact your county OSU Cooperative Extension Service office. The Cooperative Extension Service is funded by a cooperative agreement of the United States Department of Agriculture, Oklahoma State University and county commissioners. The phone number of the office serving your area can generally be found under the county government section of your directory. This program was developed by Oklahoma State University, 4-H Youth Development. Questions, comments or suggestions should be addressed to:

Ag in the Classroom Coordinator
Oklahoma 4-H Youth Development
205 Poultry Science Building
Oklahoma State University
Stillwater, OK 74078

TABLE OF CONTENTS

Acknowledgments ..... *ii*
Preface ..... *iii*
Organization of the Materials ..... *iv*
Response Page ..... *v*
Table of Contents ..... *vi*

LANGUAGE ARTS

A DAY WITHOUT AG ..... LA 1
AG LIBS ..... LA 2
FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
WRITING THE WIND ..... LA 6
PICKING PEANUTS ..... LA 7
RACING ROOSTERS ..... LA 8
THOSE PUZZLING PORKERS ..... LA 9
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11
BREAKING THEM DOWN ..... LA 12

READING

FLEECE AS WHITE AS SNOW? ..... R 1
GOODNESS, GRADY! ..... R 2
BUILD A BURGER ..... R 3
THE BRAND OF HISTORY ..... R 4
FROM BOLLS TO BOLTS ..... R 5
RIDE THE WILD LEAF CYCLE ..... R 6

INFORMATION SKILLS

LET YOUR FINGERS DO THE WALKING ..... IS 1
BUILD A BUG BARN ..... IS 2
LOOK OUT BELOW! ..... IS 3
WHAT'S IN THE GARDEN? ..... IS 4
THE FABLE OF FRANNY AND HER
FABULOUS FAINTING GOAT ..... IS 5
LABEL LANGUAGE ..... IS 6

MATHEMATICS

BARNYARD MATH ..... M 1
CHECK YOUR FARM ACCOUNT ..... M 2
THE PAPER CHASE ..... M 3
SNACK SACK ..... M 4
EASY AS PUMPKIN PIE ..... M 5
THE GRAIN GAME ..... M 6
SEED SWAPPING ..... M 7
BE A BUG SCOUT ..... M 8
BEESWAX ..... M 9

GARDEN GRID ..... M 10
MAKE MINE TURKEY ..... M 11

SCIENCE

CASE OF THE MISSING PUMPKIN ..... S 1
PILE ON THE CHIPS ..... S 2
RINGS OF LIFE ..... S 3
THE WHEAT PLANT ..... S 4
TIN CAN TREAT ..... S 5
BRANCHING INTO SPRING ..... S 6
CHEW IT TWICE ..... S 7
LET IT RAIN ..... S 8
WORM WATCHING ..... S 9
SAVE OUR SOIL ..... S 10
SOAK IT UP ..... S 11

SOCIAL STUDIES

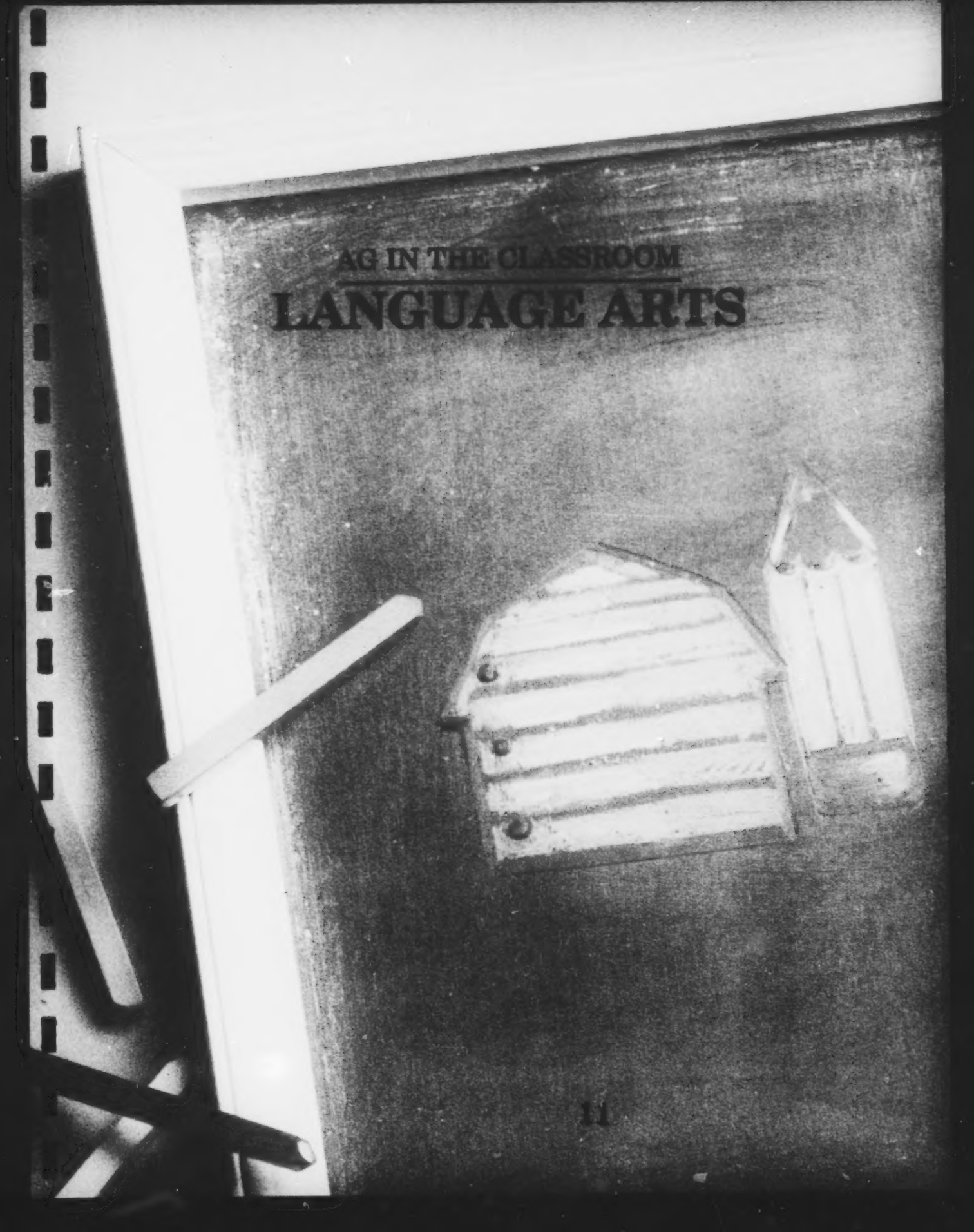
FIND YOUR WAY ON THE FARM ..... SS 1
HONEY HUNT ..... SS 2
BACK TO THE FARM ..... SS 3
OKLAHOMA GROWN ..... SS 4
TIME LINE OF THE LAND ..... SS 5
THE TRADING GAME ..... SS 6
WHAT'S YOUR BRAND? ..... SS 7
WHERE DOES THE RAIN FALL? ..... SS 8

VISUAL ARTS

COVERED IN QUILTS ..... VA 1
DIRTY PICTURES ..... VA 2
A LICENSE FOR AG ..... VA 3
STACK UP TO NUTRITION ..... VA 4
BEE DANCE ..... VA 5
NATURE'S COLORS ..... VA 6

APPENDICES

Glossary ..... Glossary 1
Suggestions for Requesting Assistance ..... Information 1
Resources ..... Resources 1
Oklahoma Ag in the Classroom Concepts ..... Concept 1
Lessons by Agricultural Topic ..... Index 1
Lessons by Ag in the Classroom Topic ..... Index 2
Lessons by Grade ..... Index 3
Alphabetical Listing of Lessons ..... Index 4
Pattern Pages ..... Pattern 1
Writing Pages ..... Writing 1
Miscellaneous Pages ..... Miscellaneous 1


AG IN THE CLASSROOM
LANGUAGE ARTS

A DAY WITHOUT AG

SUBJECT: Language Arts **GRADE:** 3-4

AGRICULTURAL TOPIC: Economics **CONCEPT:** I

STUDENT SKILL

The student will express personal ideas and opinions in group or individual situations.

LEARNER OBJECTIVE

The student will consider and discuss the following questions: "What is *ag*?" What are some of the ways it affects my life every day?"

LESSON

A. Step-by-Step Instructions

1. Discuss the meaning of the word "agriculture."
2. Share background material.
3. Hand out student worksheets, and have students use them to list all the agricultural products that touch their lives in a day. Then have students share their lists.

B. Background

"Ag" is short for agriculture. When you think of agriculture you probably think of people growing crops or raising cows, pigs, sheep and chickens on a farm. But agriculture means much more than that. The people who work in factories building tractors and other farm machinery play an important role in agriculture. People in universities who research new agricultural products and new ways to grow food and fiber are involved in agriculture, too. The grocer must buy agricultural products to fill the grocery shelves. The restaurant owner must buy agricultural products to prepare and serve his or her customers. The clothes you wear and the furniture on which you sit were probably made from agricultural products.

You may already know that hamburgers and fried chicken come from agricultural products, but what about fish? In Oklahoma catfish farming has become popular. Fish farming, or **aquaculture**, *is a new kind of agriculture.*

One of the fastest growing kinds of agriculture in Oklahoma is growing and selling greenhouse and nursery plants. Forestry is another growing form of agriculture. Tree farmers plant, nurture and harvest trees. Then they sell the trees to companies that make paper products. The people who work in factories where they make paper and the people who sell it in stores are as much a part of agriculture as the farmer who plants the tree.

Think of all the ways in which agriculture touches your life. When you wake up in the morning, you might be lying on cotton sheets. Your pillow could be filled with down feathers from a goose. The frame of your bed is probably made of wood. These are all ag products, and you aren't even out of bed yet. When you do get out of bed, you may put your feet onto a rug made from the wool of a sheep or a linoleum floor made from soybean oil. The soap you use in the shower might contain cottonseed oil or lanolin, a kind of oil from the sheep's wool. The handle of your hairbrush might be made from the bones and horns of a beef animal, and the bristles might be the bristles, or hair, of a pig. The towel you dry off with and the jeans and T-shirt you put on are made from cotton. Once you get to school you might pick up a crayon made from pig fat.

You've already used dozens of agricultural products, and you haven't even started eating yet. Just imagine a day without agriculture. Do you think you could survive?

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Carrier, Roch, *Hockey Sweater*, Tundra, 1984.
Cole, William, ed., *Poem Stew*, Harper and Row, 1981.
Dixon, Annabelle, *Wool, Threads Series*, Garrett, 1990.

D. Evaluation

Were students able to list a variety of agricultural products they need to get through a day? Did they understand the meaning of the word "ag" and how difficult it would be to get through a day without it?

E. Related Activities

1. Have students bring agricultural products from home and pile them all in one area. Then invite another class or the principal to view the display, and have students explain the importance of agriculture.
2. Have students divide the items on their lists into categories (animal products/plant products, things to eat/things to wear). Have them create their own categories.
3. Discuss the concepts of "want" and "need." Divide students into groups and have them go through their lists and decide which are needs and which are wants. Then have students share their findings during a class discussion.

Name _____

A Day Without Ag

Make a list of all the agricultural products you use in a day. If you run out of space, use the back of this page.

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994

AG LIBS

SUBJECT: Language Arts GRADE: 3-4

AGRICULTURAL TOPIC: Economics CONCEPT: I

STUDENT SKILL
The student will demonstrate appropriate practices in written composition.

LEARNER OBJECTIVE
The student will complete three paragraphs, using verbs, nouns, adjectives and adverbs to fill in the blanks.

LESSON

A. Step-by-Step Instructions
1. Share background material, and review nouns, verbs, adverbs and adjectives with the class.
2. Hand out the student worksheets.
3. Instruct students to read through the stories, then fill in the blanks, using the part of speech printed underneath each blank. Encourage students to use their imaginations and make the stories as silly or as serious as they wish.
4. Have students share their finished stories with the class.

B. Background

The average American farmer produces food and fiber for about 100 people both in our own country and around the world. Twenty years ago the average farmer produced enough food and fiber for about 67 people. Producing food and fiber on the farm and moving it around to people is our nation's number one industry.

Oklahoma's prairie grasslands provide good food for raising beef cattle. Our wide open spaces are good for growing winter wheat -- our biggest crop. But Oklahoma farmers grow many different kinds of crops. Cotton, peanuts and soybeans are all important Oklahoma crops. Oklahoma farmers also grow corn, oats, sorghum, pecans and small crops of watermelon, strawberries, blackberries, peaches and even pine trees, for making paper products.

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Galdone, Paul, *The Little Red Hen*, Seabury Press, 1973.
Hall, Katy, *Buggy Riddles*, Dial, 1986.
Keller, Charles, *Alexander the Grape: Fruit and Vegetable Jokes*, Random House, 1985.
Kings, P.E., *Down on the Funny Farm*, Random House, 1986.

D. Evaluation
Were the students able to correctly fill in the blanks, using nouns, verbs and adjectives? Did they enjoy reading their stories aloud?

E. Related Activities
1. Have students create illustrations for their stories.
2. Have students make up stories or paragraphs and leave blanks for their classmates to fill in.

3. The story on student worksheet B is loosely based on the story, "The Little Red Hen." Have students discuss how the moral of the story changes as they change the parts of the story.
4. Have students use other familiar fables as the basis for creating their own fables.

Name _____

Ag Libs

Fill in the blanks in the story below, using the part of speech printed underneath the line.

A

On the _____ farm, many _____
(adjective) (noun)

_____ to the barn. The _____ are usually
(verb) (noun)

the _____ ones there. They _____ and
(adjective) (verb)

squeak until someone comes to _____ them.
(verb)

The _____ finally settle down and _____ the morning
(noun) (verb)

away in the _____ of the _____ sun.
(noun) (adjective)

B

Planting a _____ is easy. First, make a
(noun)

_____ hole, and place the _____ in it.
(adjective) (noun)

_____ dirt over the top, and _____
(verb) (verb)

down the _____ with your hand. _____
(noun) (verb)

the _____ over the _____ until it is
(noun) (noun)

wet, but not soaked. Make sure it gets _____.
(noun)

Wait and see the _____ _____ appear.
(adjective) (noun)

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Name _____

Ag Libs

Fill in the blanks in the story below, using the part of speech printed underneath the line.

C

One day a _____ red _____ was _____ in the
adjective noun verb

barnyard when she came across some _____ of wheat. "I think I'll _____
noun verb

these _____ and _____ some wheat. Who will _____
noun verb verb

me? Then we can _____ some _____
verb adjective

bread.

"Not I!" _____ the cow.
verb

"Not I!" said the _____.
noun

"Not I! _____ the lamb.
verb

So the _____ _____ the _____ all by herself.
noun verb noun

After several _____ the _____ grew. The _____
noun noun noun

worked _____ to _____ and _____ the wheat.
adverb verb verb

At last the _____ was ready to _____ some _____.
noun verb noun

Everyone _____ the _____. They all wanted to _____ it.
verb noun verb

"OH, NO!" the _____ said. "I _____ all by myself to make
noun verb

this _____. Now I am going to _____ it—ALL BY MYSELF!
noun verb

And that is just what _____ did.
pronoun

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FARM CODES

SUBJECT: Language Arts **GRADE:** 3-4

AGRICULTURAL TOPIC: Economics **CONCEPT:** I

STUDENT SKILL
The student will communicate through a variety of written forms, using paper and/or technology.

LEARNER OBJECTIVE
The student will discover facts about Oklahoma agriculture, using a code to find the missing word.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets.
2. Discuss with students how to break the code shown on the student worksheet.
3. Note that all the symbols represent things that can be found on many Oklahoma farms. Share the Oklahoma facts found in the background material.

B. Background

Oklahoma Farm Facts

1. Agriculture is Oklahoma's number one industry.
2. The number one agricultural commodity in Oklahoma in 1991 was cattle and calves.
3. In most years Oklahoma ranks second nationwide in the production of winter wheat and fourth in the production of all kinds of wheat.
4. Cotton products earned about 56 million dollars in Oklahoma in 1991.
5. Oklahoma poultry farmers produced $259 million worth of poultry and eggs in 1991.
6. Oklahoma's annual average precipitation between 1920 and 1990 was 33.68 inches.
7. In 1991 the average age of Oklahoma farmers was 53.6 years old.
8. The average size of an Oklahoma farm in 1991 was 449 acres. The average for the United States is 467 acres.
9. Oklahoma has nearly 15 million acres of cropland and a little over 31.5 million acres of land in farms.
10. Forest land takes up 4.6 percent of Oklahoma's total land area.

Source: Oklahoma Department of Agriculture, *Oklahoma Agricultural Statistics*, 1991, and Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Books

Brittain, Bill, *All the Money in the World*, Harper Collins, 1979.
Gammell, Stephen, *Once Upon MacDonald's Farm*, Macmillan, 1984.
Gardiner, James, *Top Secret*, Bantam, 1987.
Robert, Adrian, *Secret of the Old Barn*, Troll, 1985.

Additional Resources

"My Family Farm," Illinois Farm Bureau, Ag in the Classroom, Field Services Division, 1701 Towanda Ave., Bloomington, IL 61701, 309-557-2219 (bulletin board kit for students in grades 1-3, $4.75).

"Slice," National Farm City Council, Inc. 225 Touhy Ave, Park Ridge, IL, 60068 (lessons for primary and intermediate students introducing farm life to children who live in cities, $3).

D. Evaluation

Answers for the student worksheet are as follows: 1. industry; 2. grains, meats; 3. wheat, peanuts, cotton; 4. quarter; 5. rainfall; 6. erosion; 7. brand.

E. Related Activities

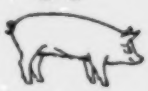
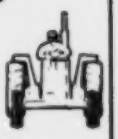
1. Have students create their own secret codes and use them to write messages to exchange with friends.
2. Have students go to the library to research the Morse code.
3. Brainstorm to find a saying or message the students like. On the board show students how to reverse the letters, then use a mirror to read the code. Challenge students to create their own mirror codes.
4. Show students how to create hidden messages with milk. Use a small amount of milk and a clean paintbrush. Dip the brush in the milk, and paint a word or simple saying onto a sheet of clean white paper. Allow the secret message to dry. After the paper is dry, hold it up to the light, and the message will be revealed.

Name _____

Farm Codes

A

Use the picture code below to fill in the missing letters on student worksheet B.

A  sow	**B** tractor 	**C** bale of hay	**D** chick	**E** calf
F milk truck	**G** lamb	**H** hen	**I** hamburger	**J** rooster
K lady beetle	**L** egg	**M** pine tree	**N** cotton boll	**O** corn
P turkey	**Q** pumpkin seed	**R** pecan	**S** angus bull	**T** honey bee
U dairy cow	**V** tomato	**W** beet	**X** barn	**Y** milk
Z peanut				

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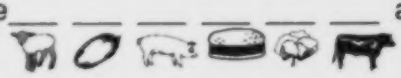
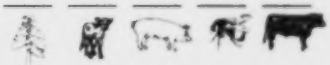
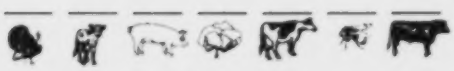
Name _____

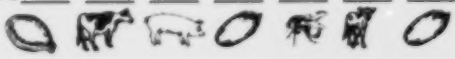
Farm Codes B

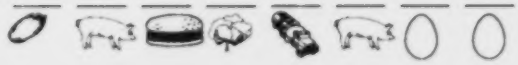
Use the picture code on student worksheet A to fill in the missing letters in the sentences below.

1. Agriculture is the number one in the U. S.

2. Farms and ranches produce the  and  the public eats.

3. Some major crops grown in Oklahoma are ,  and .

4. Many Oklahoma ranchers raise and race  horses.

5.  affects agriculture production in our state.

6. Soil being moved by water or wind is called .

7. An easy way to identify the owner of the farm animal is by looking at the animal's .

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FARM CONNECTIONS

SUBJECT: Language Arts **GRADE:** 3-4

AGRICULTURAL TOPIC: Economics **CONCEPT:** III

STUDENT SKILLS

The student will communicate through a variety of written forms, using paper and/or technology.

LEARNER OBJECTIVE

The student will write a letter to an Oklahoma farmer.

LESSON

A. Step-by-Step Instructions

1. Get a list of Oklahoma farmers from your county Extension office, FFA advisor, Young Farmer's group, farm service agency or other resource.
2. Have students compose letters to their farm pen pals sharing what they have learned and experienced while working with the *Ag in the Classroom* curriculum.
3. Have students share responses with their classmates.

B. Background

Farmers lead active and interesting lives. Each new day presents a different set of challenges. One day the farmer might need to make a quick decision about an injured cow. The next day he or she might have to decide whether to sell all his or her grain on the market or wait a few days to see if the price will go up. Sometimes the price will go up, but it might just as easily go down.

The Oklahoma farmer today might be a man or a woman. Most Oklahoma farms are run by husbands and wives who work together as partners.

In 1987 Oklahoma had over 70,000 farms. The average size of an Oklahoma farm is about 450 acres. Lincoln County, in central Oklahoma, has more farms than any other county in the state. There are over 1,600 farms there. In 1991 the average age of an Oklahoma farmer was 54.

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Books

Anderson, Joan, and George Ancona, *The American Family Farm,* Harcourt, Brace, Jovanovich, 1989.

Fleischman, Sid, *McBroom's Wonderful One-Acre Farm,* Greenwillow, 1992.

Gibbons, Gail, *Farming,* Holiday House, 1988.

Imershein, Betsy, *Farmer,* Simon and Schuster, 1990.

Siebert, Diane, *Heartland,* Harper Collins, 1989.

Additional Resources

"Food For Thought," Dupont Company, Graphics Center, 1515 South Garnet Mine Road, Boothwyn, PA 19061 (free placemat, with a quiz and facts about food consumption and technology).

"My Family Farm," Illinois Farm Bureau, Ag in the Classroom, Field Services Division, 1701 Towanda Ave., Bloomington, IL 61701, (309)557-2219 (bulletin board kit for grades 1-3, $4.75).

VIDEO PALS, 1-800-VID-PALS (sets up national and international video exchange contacts and will try to match classes with specific interests).

D. Evaluation

Were students able to organize and compose letters to their farm pen pals? Did they respond in a positive fashion to the mail relationship?

E. Related Activities

1. If a pen pal relationship develops, invite the farmer or farm family to visit the classroom, or plan a field trip to the farm.
2. Sign up class members for a pen pal exchange. Many address exchange opportunities are listed in professional teaching periodicals.

HOW THE BRAHMAN BULL GOT ITS HUMP

SUBJECT: Language Arts GRADE: 3-4

AGRICULTURAL TOPIC: Beef CONCEPT: I

STUDENT SKILL
Utilize the writing process to develop and refine composition skills.

LEARNER OBJECTIVE
The student will compose a fictional story explaining how the Brahman bull got its hump.

LESSON

A. Step-by-Step Instructions

1. Read the Rudyard Kipling story, "How the Camel Got His Hump," to your class, and lead a discussion on the difference between fact and fiction.
2. Share background material.
3. Hand out student worksheets. Lead a class brainstorming session on how the Brahman bull got its hump. Then have each student write his or her own story, or divide students into groups of four or five and let them write group stories.
4. Have students share their stories orally.

B. Background

If the Brahman bull looks like it was put together from the parts of several different animals, that's because it was, in a way. The ancestors of Brahman cattle were several different types of hump-backed cattle from India. Cattle breeders in the southern United States developed Brahman cattle between 1854 and 1926.

The Brahman has a humped back, long, drooping ears and loose skin. Like the camel, the Brahman stores food and water in the odd-looking hump on its back. The hump is a deposit of fat. Farmers and ranchers in the southeastern U.S. and the Gulf States like to raise Brahman cattle because they can stand the heat, and insects don't bother them much. Some cattle breeders have tried crossing Brahman cattle with other breeds of American beef cattle to develop other breeds that can stand harsh conditions.

Brahman cattle are also called "Brahma" or "zebu." Many Brahmans are light to medium gray, but there are some that are red and some that are almost black. Brahman bulls weigh between 1,600 and 2,200 pounds. Brahman cows weigh between 1,000 and 1,400 pounds.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Aardema, Verna, Dillon, Leo, and Diane Dillon, *Why Mosquitoes Buzz in People's Ears*, Dial, 1975.

DePaola, Tomie, *The Legend of the Bluebonnet, an Old Tale of Texas*, Putnam, 1983.

De Paola, Tomie, *The Legend of the Indian Paintbrush*, Putnam, 1991.

Kipling, Rudyard, and Quentin Blake, *How the Camel Got His Hump*, Picture Book Studio, 1991.
Kipling, Rudyard, and Caroline Ebborn, *How the Leopard Got His Spots*, Dover, 1992.
Soloff-Levy, Barbara, *How to Draw Farm Animals*, Troll, 1985.

Additional Resources

American National Cattlewomen, P.O. Box 3881, Englewood, CA 80155 (brochure on beef by-products, 10 cents each).
American Brahman Breeders Association, 1313 La Concha Ln., Houston, TX 77054.
"Farm Animals, Close Up and Very Personal," Stage Fright Productions, P.O. Box 373, Geneva, IL 60134 (VHS tape, $16.95).
"Twelve Myths and Facts," National Cattlemen's Association, 5420 S. Quebec St., Englewood, CO 80155 (videotape for grades 1-3 and 4-6, $15).

D. Evaluation

Did students come up with original ideas about how the Brahman got its hump?

E. Related Activities

1. Have students look up "Brahman" and "India" in the dictionary and the encyclopedia, and talk about the place of cattle in Indian culture. Have students locate India on a world map.
2. Choose an object that is distinctive to your school grounds or your town, and have students write fictional stories describing its origins. Help students get started by brainstorming as a group. Encourage students to use their imaginations. Have students share their stories. Then discuss factual origins.
3. Have students write letters to the American Brahman Breeders Association asking for information about Brahman cattle. Gather all the letters in one envelope for mailing. See *Additional Resources* for the address.

Name _____

How the Brahman Bull Got Its Hump

Write your own story explaining how the Brahman bull got its hump. Then color the picture at the bottom of the page.

How the Brahman Bull Got Its Hump

On the back of this page, draw your own picture of a Brahman bull.

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WRITING THE WIND

SUBJECT: Language Arts GRADE: 3-4

AGRICULTURAL TOPIC: Windmills CONCEPT: III

STUDENT SKILL

The student will effectively express ideas in oral and written modes for a variety of purposes and audiences.

LEARNER OBJECTIVE

The student will compose sentences or phrases, using adjectives that describe windmills.

LESSON

A. Step-by-Step Instructions

1. Review adjectives. Write a noun on the board, and have students name appropriate adjectives.
3. Hand out student worksheets, and review directions for making windmill blades.
4. Use straws, matchsticks, cotton swabs or blunt-ended toothpicks to make the windmill base.

B. Background

Windmills were probably first used in Iran as long ago as 600 A.D. Ancient windmills had small sails that caught the wind to turn an axis that produced energy to grind grain. By the 1100s Europeans had discovered the usefulness of the windmill. They used them for grinding grain and pumping water from lowlands.

The American windmill was developed for the farmer during the 1800s and 1900s. The wheels of these windmills were made from curved blades of wood or steel. They were mounted at the end of a horizontal shaft. This shaft was connected by a vertical rod to a pump sunk deep into the ground. The windmill blades moved to face the wind, which would blow them and produce enough energy to pump the water up from the ground. The groundwater ran through a horizontal water pipe after it came up from the ground. The farmer would place a large tank at the end of that pipe and keep it filled with water for the farm animals to drink. Some farm families would also have windmills near their homes to provide water for household use. Windmills can still be seen dotting the landscape in many of the Plains and Western states.

Modern technology has produced an updated version of the windmill as a way of producing electricity. This windmill is called a wind turbine. Most of the modern wind turbines are located in California and Hawaii.

Source: Oklahoma Cooperative Extension Service, Biosystems and Agricultural Engineering, OSU

C. Resources

Climo, Shirley, *The Match Between the Winds,* Macmillan, 1991.
Harness, Cheryl, *The Windchild,* Holt, 1991.
Rickard, Graham, *Wind Energy,* Gareth Stevens, 1991.
Swarthrut, Glendon, and Kathryn Swarthrut, *Whichaway,* Knopf, 1992.
Williams, John, *Simple Science Projects With Air,* Gareth Stevens, 1992.

D. Evaluation

Was the student able to create between eight and ten phrases or sentences describing the windmill or its function?

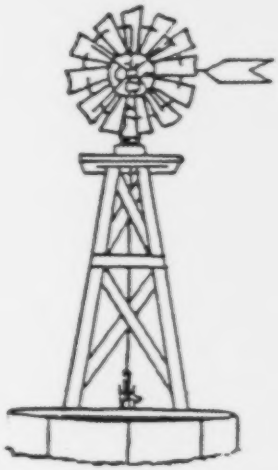
E. Related Activities

1. Brainstorm about other inventions that depend on the wind (hot air balloons, airplanes, hang gliders).
2. Check out an origami book from the library and show students how to make pinwheels. The pinwheel is based on the same principal as the windmill.
3. Draw the base of a windmill. Add as many blades as possible, and write adjectives on them.

Name _____

Writing the Wind

Cut out the windmill blade. Write a sentence or phrase on the blade that describes windmills.



An ***adjective*** describes a noun or a pronoun. Use adjectives to add interesting details to your writing.

Lay the windmill blades on a piece of paper to create a picture of a windmill. Make the base with straws, toothpicks or other materials your teacher provides.

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PICKING PEANUTS

SUBJECT: Language Arts GRADE: 3

AGRICULTURAL TOPIC: Peanuts CONCEPT: III

STUDENT SKILL
The student will demonstrate appropriate conventions in written composition.

LEARNER OBJECTIVE
The student will create sentences, using words printed on pictures of peanuts.

LESSON

A. Step-by-Step Instructions

1. Bring unshelled peanuts to class, and hand out two or three per student. Have students examine, describe and discuss the different qualities of a peanut. Ask if anyone has ever eaten peanuts or any kind of food that was made with peanuts.
2. Share the background information.
3. Hand out student worksheets. Read through the instructions with your class. Have students create sentences, using the words printed on the peanut shapes.

B. Background

The peanut is not really a nut, but a ***legume****, related to beans and peas. The first peanuts probably grew in Brazil. The nuts of the peanut grow underground. In this country peanuts grow best in light textured, sandy soils. Oklahoma produces nearly 250 million pounds of peanuts on about 107,000 acres. Peanuts are a high value crop. Most of Oklahoma's peanuts grow in southwest Oklahoma, in Caddo County, or in southern Oklahoma, in Bryan County.*

People eat large numbers of peanuts in the form of nuts, peanut butter and candy bars and baked goods. Other peanuts are crushed to extract peanut oil. Peanut oil is usually more expensive to use in cooking than other oils. However, since it has no flavor, no cholesterol and can be heated to a higher temperature without smoking, it is used by many restaurants for frying foods. It is also used in margarine, shortening and salad oil.

Peanuts are 25 to 30 percent protein and about 50 percent oil. The meal that remains after the oil is extracted from peanuts makes an excellent feed for cattle, hogs and poultry because of the high protein content. In early days, peanuts were grown as feed. Hogs, in particular, like peanuts and will root out the nuts themselves if turned into the peanut fields. Whole peanuts are seldom used for animal feed today, because peanut growers can make more money selling them for people to eat. Some other names for the peanut are "groundnut," "pinder" and "goober."

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Aliki, *A Weed is a Flower: The Life of George Washington Carver,* Simon and Schuster, 1988.
Collins, David, *George Washington Carver,* Watts, 1990.
McLean, Bill, *The Best Peanut Butter Sandwich in the Whole World,* Firefly, 1991.
Wyler, Rose, *Science Fun With Peanuts and Popcorn,* Simon and Schuster, 1986.

Additional Resources

Growers' Peanut Food Production, 109 South Main Street, Rocky Mountain, NC,

27802 (free lesson plans, with poster and activity sheets, covering history, nutrition, science and geography. Indicate grade level when ordering.)

"Having Fun With Peanuts," Florida Peanut Producers Association, P.O. Box 447, Graceville, FL 32440 (teacher's guide, pre-test, evaluation and worksheets on history of the peanut and nutritional science).

National Peanut Council, 101 S. Peyton Street, Ste. 301, Alexandria, VA 22314, (703)838-9500.

Oklahoma Peanut Commission, 624 W. Independence #111, Box 1949, Shawnee, OK 74802, (405)275-5994, Fax (405)878-0887.

D. Evaluation

Sentences should be evaluated on an individual basis by the teacher.

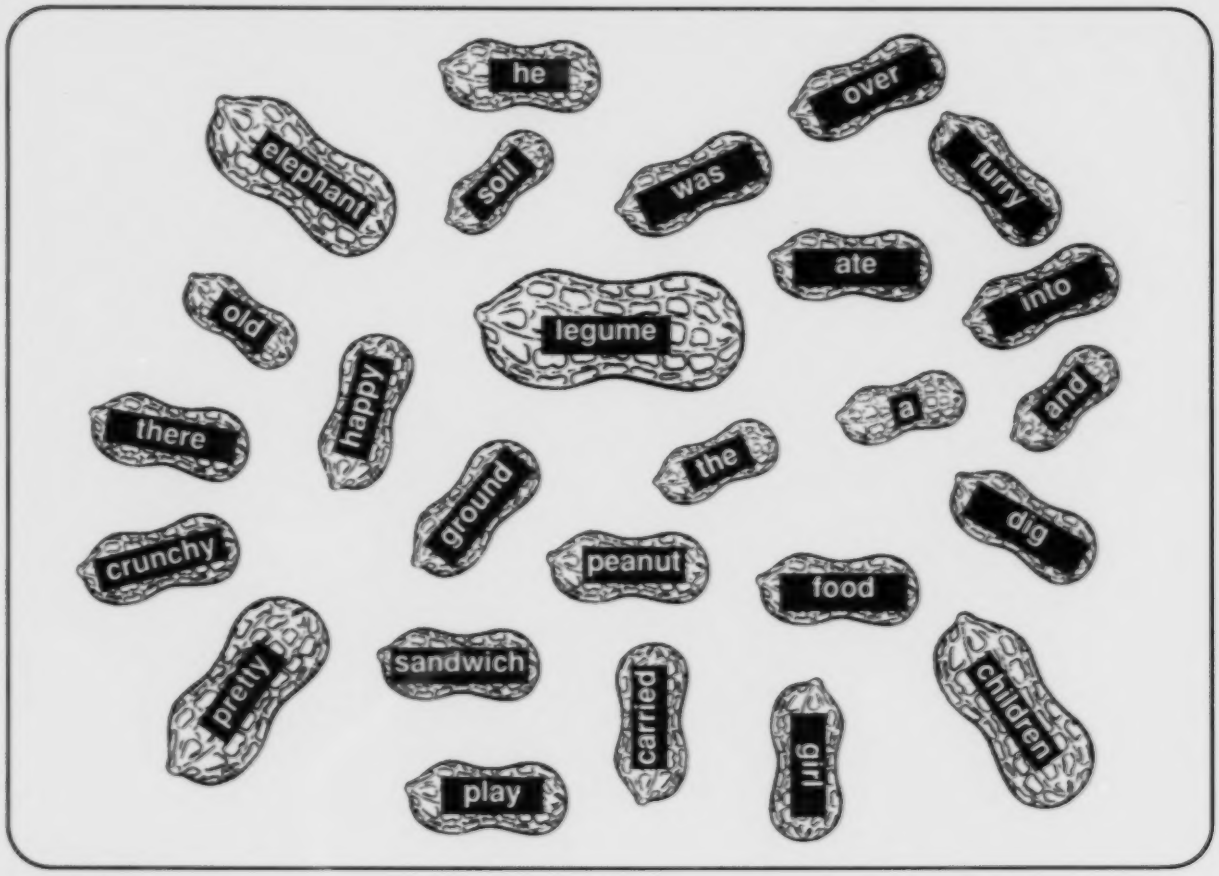
E. Related Activities

1. Pass out a few peanuts to each student. Have students shell the peanuts, then crush the meat on a piece of dark-colored construction paper and observe the oily spot that appears.
2. Have students read labels on products they find at home and make a list of all those that contain peanut oil.
3. Grow a classroom peanut plant. Soak unshelled, unroasted peanuts in water overnight. Push three peanuts one inch deep into level soil in a clay pot. DO NOT pack soil. Keep the soil moist, but not wet. Peanuts should sprout in five to eight days.

Name _____

Picking Peanuts

Write at least five sentences, using only the words on the peanuts. You may use the words more than once.



Start your sentences with capital letters, and end them with the correct punctuation.

1. _____

2. _____

3. _____

4. _____

5. _____

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RACING ROOSTERS

SUBJECT: Language Arts GRADE: 3

AGRICULTURAL TOPIC: Poultry CONCEPT: I

STUDENT SKILL
The student will demonstrate appropriate practices in written composition.

LEARNER OBJECTIVE
The student will be introduced to poultry-related words, and place them in alphabetical order.

LESSON
A. Step-by-Step instructions
1. Hand out student worksheets.
2. Introduce and discuss the poultry words listed at the top of the student worksheet. Discuss pronunciation, and share background information.
3. Have students read and follow the instructions and complete the students worksheets.

B. Background
Vocabulary
candling - to examine eggs by holding them to a bright light in a dark room.
chicks - young chickens, from birth to one year old.
cockerel - male chicken less than a year old.
fryer - a young chicken weighing between three and four pounds suitable for frying. Older chickens are called baking hens and taste better if they are baked or stewed.
gobbler - a mature male turkey.
hatchery - a place for hatching eggs, especially poultry or fish eggs.
hen - a mature female chicken or turkey.
incubator - an apparatus used in warming eggs to a temperature in which they will hatch.
layer - a hen which lays eggs regularly.
molting - dropping feathers in order to grow new ones.
pullet - a young hen, usually less than one year old.
rooster - a mature male chicken.

There are many different breeds of chickens. Some of the more common breeds are Rhode Island Red, Plymouth Rock and White Leghorn. Male chickens are called roosters. Females are called hens. A male chicken less than one year old is called a cockerel, and a female chicken less than one year old is called a pullet. Chickens younger than one year old--male and female--are called chicks.

Baby chicks are covered with soft, fluffy down, but as they grow, feathers will appear. Newly hatched baby chicks are fed chick mash, which is a special type of food. Adult chickens need a different type of feed. The feed is made of corn, soybeans, wheat, alfalfa meal, sorghum and a variety of other ingredients. The ingredients are all mixed together to provide a balance of protein, vitamins and minerals that the chickens need.

Today most chickens are raised in large structures -- some designed just for laying hens and some for raising chicks to fryer size. Some farmers still raise a few chickens the way people did years ago, in small flocks. These birds are called "free-range" chickens, because they are free to roam around looking for bugs and

grass seeds to eat. They don't taste the same as chickens that are fed special foods. Free-range chickens help control insects and also provide natural fertilizer.
Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Butterworth, Oliver, *The Enormous Egg,* Dell, 1987.
Holmes, Efner, *Amy's Goose*, Harper Collins, 1986.
Polacco, Patricia, *Just Plain Fancy,* Bantam, 1990.
Polacco, Patricia, *Rechenka's Eggs*, Putnam, 1988.

Additional Resources

American Egg Board, 1460 Renaissance Drive, P. O. Box 858, Park Ridge, Il 60068-0858.
"Teaching Scientific Things . . . Like Eggs," Barbara Bannister, 1925 SE Taggart, Portland, OR 97202-2252 (a book of simple activities to teach the science of eggs, $17).

D. Evaluation

Were students able to place the words on the poultry worksheet in alphabetical order?

E. Related Activities

1. Have dictionary drills in the classroom. Divide the class into three or four teams. Have team members take turns racing to find definitions of the poultry words as you read them. The first person to find the definition should read it aloud.
2. Take your class to visit a hatchery or local poultry farm.
3. Contact your county Extension office, and obtain materials for hatching chicks in your classroom.
4. Have each student draw a simple figure of a chick on a wooden block. Provide bottles of glue, and instruct students to use their glue bottles like pens to outline the drawings. Have students press string onto the glue outlines and completely outline their drawings with string. Leave the blocks to dry overnight. Provide each student with a sponge and tempera paint. Instruct students to spread about a tablespoon each of tempera paint on the sponges. Students should press their string images to their sponges, then lift the blocks and press them onto the paper. Have students stamp the image several times to create flocks of chickens.

Name _____

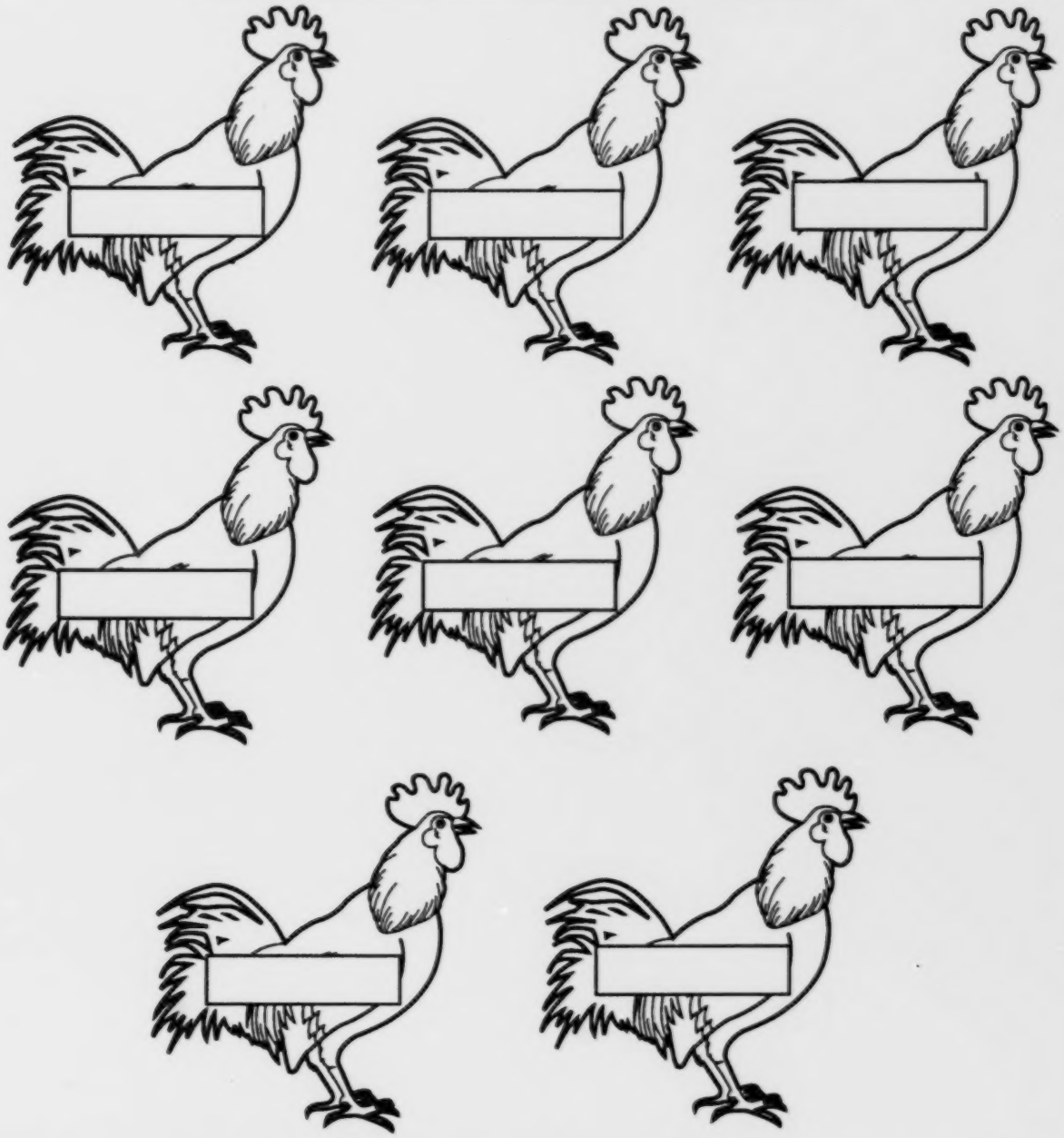
Racing Roosters

A

Write a poultry word on each rooster body, then cut out the roosters.

Poultry Words

incubator	gobbler	layer
candling	fryer	molting
hen	hatchery	



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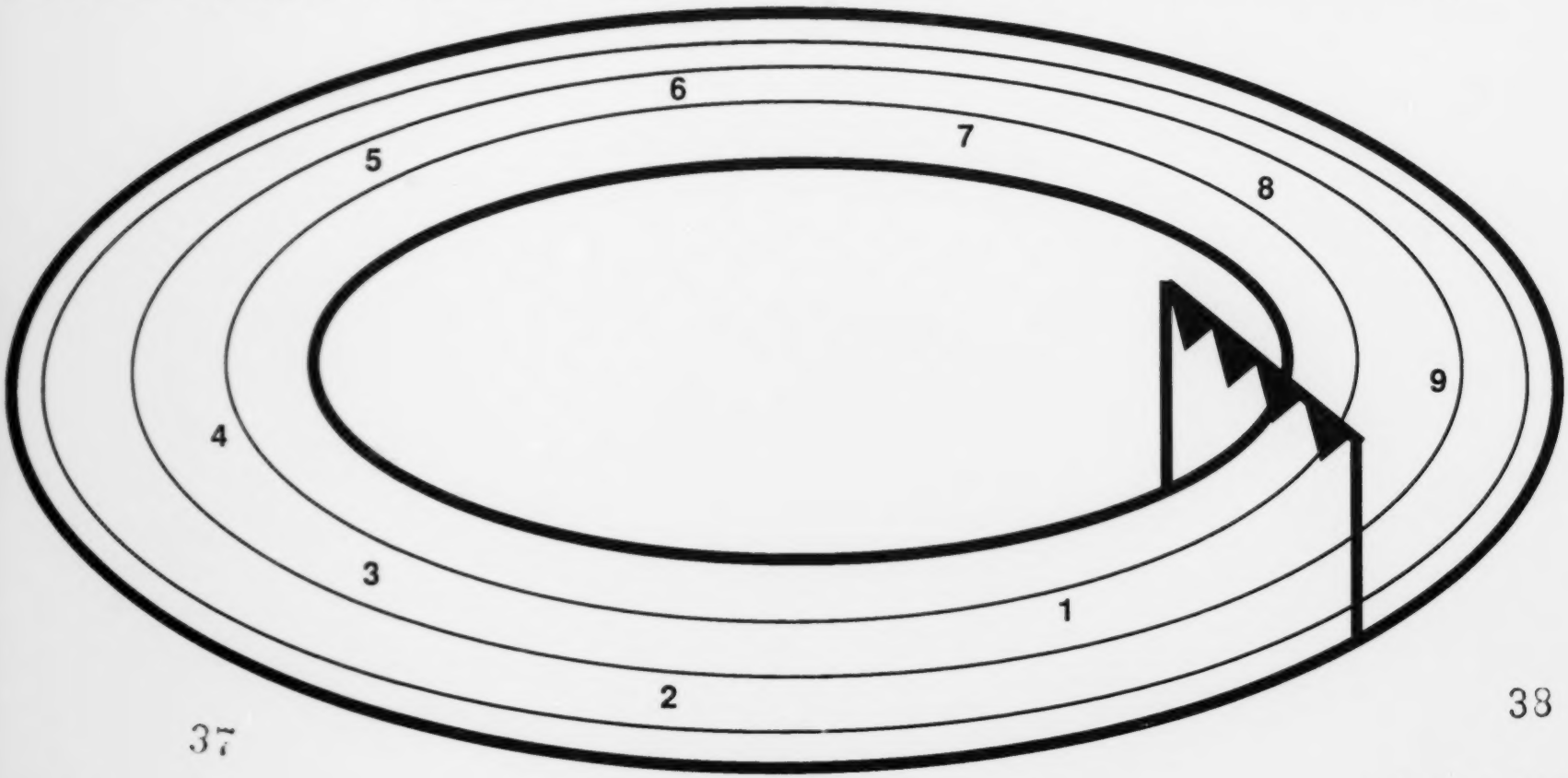
Ag in the Classroom

Name_____

Racing Roosters

B

Paste your racing roosters in alphabetical order onto the race track. The number one spot is where the first rooster should go.



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THOSE PUZZLING PORKERS

SUBJECT: Language Arts GRADE: 3

AGRICULTURAL TOPIC: Swine CONCEPT: I

STUDENT SKILL
The student will expand vocabulary through word study, literature and class discussion.

LEARNER OBJECTIVE
The student will be introduced to pork-related words and locate them in a word search puzzle.

LESSON

A. Step-by-Step Instructions
1. Introduce vocabulary words, and have students contribute to class definitions.
2. Direct students to find the pork words in the word search puzzle.
3. After students have finished the word search, have them choose six of the words listed at the bottom of the page and research their relationship to swine.

B. Background
Vocabulary

bacon - the back and sides of a pig, salted and smoked.
boar - a male pig.
breed - a race or variety of animals related by descent and similar in most characteristics.
chop - a piece of meat chopped off; a slice or small piece; a small cut of meat, often including a rib.
hog - a swine, pig, sow, or boar, suitable for sale at market.
lean - the part of the flesh in an animal which consists mostly of muscle without fat.
litter - a group of offspring, all born at the same time to a sow or some other kind of mammal, which commonly gives birth to several young at one time.
mud - a slimy, sticky mixture of solid material and water.
muscle - a tissue whose special function is making motion.
pen - a small enclosure for animals, a place of confinement.
pig - a young swine.
pork - the flesh of swine, fresh or salted, which is used for food.
razorback - a wild hog from the southeastern United States having a narrow body, long legs and a ridged back.
ribs - a series of curved bones extending from the spine in most vertebrates.
runt - any animal that is unusually small compared with others of its kind.
sausage - minced, highly seasoned meat, sometimes stuffed inside a casing. A hot dog is one kind of sausage.
sow - an adult female swine.
snort - a noisy expulsion of air through the nose.
swine - a mammal with hooves, a stout body covered with bristles, short legs and a long snout.

It takes about six months from the time a pig is born before it is ready to go to market to be sold as meat. Pigs stay with their mothers to nurse for three to six

weeks until they learn to eat feed. After that the farmer will feed them special feeds made from corn and other grains which will help them grow.

Swine raised by farmers provide us with meat called pork. We eat pork in many different forms. Pork chops, pork steaks and pork roasts are three cuts of pork you may have eaten at some time. Other cuts are salted and processed to make ham, bacon and sausage. Pork meat is a good source of protein, minerals and vitamins.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Adler, C. S., *Help, Pink Pig!* Avon, 1991.

Brown, Marc, and Stephen Krensky, *Perfect Pigs, An Introduction to Manners,* Little, 1983.

Browne, Anthony, *Piggybook,* Knopf, 1986.

Cole, Brock, *Nothing But a Pig,* Farrar, Strauss and Giroux, 1990.

Hine, Helme, *Pigs' Wedding,* Macmillan, 1986.

White, E. B., *Charlotte's Web,* Harper Collins, 1990.

Additional Resources

"The New Pork: Delightfully Different," Auxiliary of the National Pork Producers Council, P.O. Box 10383, Des Moines, IA 50306, (515)223-2600 (educational kit).

Oklahoma Pork Council, Attn: Dutch Miller, Rt. 1, Box 254, Depew, OK 74028, (918) 329-5612.

D. Evaluation

Use the answer key to check the word search. Were students able to discover why the words listed at the bottom of the page are associated with swine?

E. Related Activities

1. Have students look up and define the pork words listed in the background materials.
2. Have students alphabetize all the pork-related words.
3. Have students write pig stories, using as many pig puzzle words as possible.
4. Have students write six sentences, using pork-related words. Then have students exchange papers and circle the pork words on their classmates papers with a pink marker or crayon and underline all the nouns.

Name _____

Those Puzzling Porkers

Find the following words in the word search puzzle. The words may be up, down, forward, backwards or diagonal. Alphabetize the words by placing the correct number in the space next to it.

sausage___	litter___	hog___	swine___	ribs___
chop___	snort___	pig___	pork___	runt___
lean___	boar___	muscle___	pen___	mud___
breed___	bacon_1_	sow___	razorback_13_	

a	z	q	b	c	t	k	s	p	k	i	y	c
l	o	h	m	u	s	c	l	e	b	v	j	u
c	g	c	v	q	t	s	t	n	l	r	j	m
s	s	d	f	n	k	a	y	g	f	a	j	l
a	t	r	o	n	s	k	e	k	c	z	z	a
b	i	i	e	t	a	a	u	f	b	r	a	r
r	n	b	f	j	u	d	c	i	r	a	j	b
e	b	s	b	y	s	n	o	c	a	z	p	w
e	t	p	s	e	a	z	r	q	b	o	a	r
d	r	w	r	u	g	r	r	i	r	r	j	b
e	e	s	b	y	e	n	o	c	a	b	p	w
e	t	o	s	e	a	z	r	q	z	a	a	e
d	t	w	r	u	g	r	r	u	k	c	m	h
b	i	e	o	d	e	l	e	a	n	k	i	f
n	l	d	t	t	f	m	t	p	h	w	p	j
i	r	o	u	n	d	t	q	e	g	a	d	g
n	e	i	p	u	e	f	f	b	v	b	q	y
p	m	a	o	r	o	b	k	h	i	n	o	g
z	c	x	h	p	l	k	r	o	p	h	s	d
m	c	q	c	g	f	b	f	g	i	p	u	l
	h	m	v	e	e	n	r	i	c	m	o	
		x	d	v	e	g	z	p	a	w	c	
		s	w	i	n	e	w	l	k	x		

Pick out six of the words below. Research to find out what they have to do with pigs.

snout	runt	stubborn	valve
smart	china	squeal	ribs
snort	bristle	swine	lard

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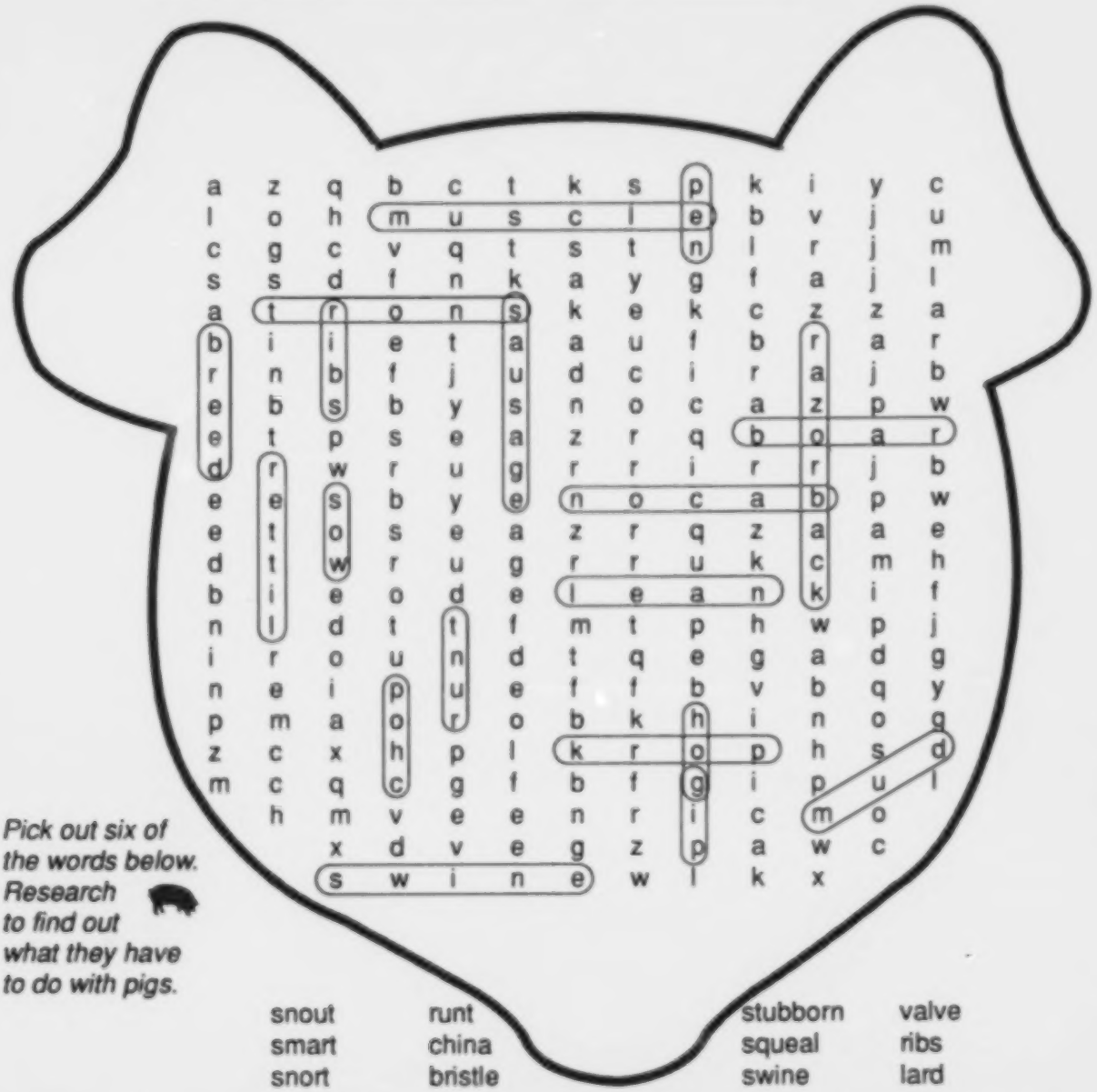
Name _____

Those Puzzling Porkers (Answers)

Find the following words in the word search puzzle. The words may be up, down, forward, backwards or diagonal. Alphabetize the words by placing the correct number in the space next to it.

sausage 16	litter 7	hog 5	swine 19	ribs 14
chop 4	snort 17	pig 11	pork 12	runt 15
lean 6	boar 2	muscle 9	pen 10	mud 8
breed 3	bacon 1	sow 18	razorback 13	


a z q b c t k s p k i y c
l o h m u s c l e b v j u
c g c v q t s t n l r j m
s s d f n k a y g f a j l
a t r o n s k e k c z z a
b i i e t a a u f b r a r
r n b f j u d c i r a j b
e b s b y s n o c a z p w
e t p s e a z r q b o a r
d r w r u g r r i r r j b
e e s b y e n o c a b p w
e t o s e a z r q z a a e
d t w r u g r r u k c m h
b i e o d e l e a n k i f
n l d t t f m t p h w p j
i r o u n d t q e g a d g
n e i p u e f f b v b q y
p m a o r o b k h i n o g
z c x h p l k r o p h s d
m c q c g f b f g i p u l
h m v e e n r i c m o
x d v e g z p a w c
s w i n e w l k x

Pick out six of the words below. Research to find out what they have to do with pigs.

snout	runt	stubborn	valve
smart	china	squeal	ribs
snort	bristle	swine	lard

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WHEAT: FROM FIELD TO MILL

SUBJECT: Language Arts GRADE: 3

AGRICULTURAL TOPIC: Wheat CONCEPT: I

STUDENT SKILL
The student will demonstrate appropriate conventions in written composition.

LEARNER OBJECTIVE
The student will practice penmanship skills and find the main ideas of several paragraphs in which the topic is wheat production.

LESSON

A. Step-by-Step Instructions

1. Bring in a supply of wheat kernels for students to handle and examine. Share the background information.
2. Review with students the method used to identify the main idea of a paragraph.
3. Hand out the student worksheets. Read the directions with your class.
4. After students have completed the assignment, have them cut out the pages and staple them together to make a booklet.

B. Background

Clarence and Susie Coldwater grow winter wheat. Late in the summer, they prepare the soil for planting. They take turns driving the tractor that pulls the plow through the fields. The plow turns the soil over and kills all the weeds. Then Clarence connects the tractor to a **disk harrow** *and drives it over the field. The disk harrow breaks the soil down into smaller pieces. When the soil is ready for planting, Clarence uses a* **grain drill** *to plant the seed.*

The wheat plant will grow about six inches before the frost comes. Each grows by producing more leaves and new stalks from the base of the plant. The new stalks are called **tillers**. *When the weather gets cold it will stop growing. This is called the* **dormant** *period. On most farms in the Great Plains cattle feed, or graze, on the young wheat plants while they are in their dormant period. The plants grow back. They are not damaged by proper grazing.*

In the spring, the warm moist days make the wheat plants grow quickly. As the wheat comes out of its dormant period, more tillers of wheat emerge. Each tiller can form another head of wheat.

Some varieties of wheat grow as tall as seven feet, but most are only between two and four feet tall. During the early summer, the plants begin to fade from dark green to tan and then to a golden brown. Then the wheat is ripe and nearly ready for harvest.

Now Clarence and Susie must race with the weather to get the wheat out of the fields. Some years the wind and rain keep the plants from ripening, and they cannot be harvested. Other years hail may break all the heads, or a lightening storm may start a range fire.

When the weather cooperates, and the wheat is ripe, the Coldwaters move fast. Clarence checks the wheat by rubbing a wheat head between his hands, blowing the **chaff** *away then chewing some of the grain. If the kernels crack easily and get soft as they're chewed, the wheat is ready to harvest.*

Clarence drives a combine across the fields to harvest the grain. When the storage bin of the combine is full, he empties it into a truck. Susie drives the truck to the grain elevator in town. Workers at the grain elevator help Susie empty the

wheat into a very deep pit. Machinery in the grain elevator raises, or elevates, Clarence and Susie's wheat into a tall bin. In many small towns in Oklahoma, the grain elevator is the tallest building in town.

The wheat stays in the grain elevator until the Coldwaters are ready to sell it. Workers at the mill keep an eye on the wheat kernels to make sure they stay cool and dry. If the wheat kernels get wet or too hot they will spoil.

Some of the wheat is sold to people who use it to make food for people and animals. The rest is cleaned and saved until it is time to plant again. One kernel of wheat can grow several hundred new kernels at the next harvest.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Cross, Verda, *Great-Grandma Tells of Threshing Day,* Whitman, 1992.
Johnson, Sylvia, *Wheat,* Lerner, 1990.
Mitgutsch, Ali, *From Grain to Bread,* Carolrhoda, 1981.

Additional Resources

"Everything You Wanted to Know About Wheat," Kansas Wheat Commission, 2630 Claflin Rd., Manhattan, KS 66502-2743 (16-page booklet, including games, craft ideas and art work, explaining the process of wheat production. Free sample to teachers. Thirty cents for multiple copies.)
Oklahoma Wheat Commission, 800 N.E. 63rd, Oklahoma City, OK 73105.
"Wheat: Field to Oven," Kansas Foundation for Ag in the Classroom, Bluemont 124, Kansas State University, Manhattan, KS 66506 (26-page student activity book with background material for teachers).

D. Evaluation

Main sentences are as follows: 1. Clarence and Susie Coldwater grow winter wheat. 2. Getting ready to grow wheat is not an easy job. 3. It is called winter wheat, because it doesn't die when the weather gets cold. 4. In the spring the warm, moist day make the wheat plants grow quickly. 5. When the wheat is ready for harvest, Clarence and Susie must race with the weather to get it out of the fields. 6. The Coldwaters couldn't grow wheat if they didn't have the right kind of machinery.

E. Related Activities

1. Have students summarize or write the main idea of each paragraph in their own words.
2. Place a folded paper towel on a paper plate, and lay 100 wheat kernels on top. Sprinkle the seeds with water, then lay another folded paper towel on top. Sprinkle daily with water. Soon the kernels will begin to sprout. After several days, have students count the seeds that have sprouted. Have students pretend they are farmers and decide if they want to plant this type of wheat, based on the number of seeds that germinated.
3. Call a milling company or a seed supply company, and ask for the names of the most popular seed varieties being planted during the current season. Read the names to your students, and have them discuss how the different seed varieties got their names.
4. Invite a wheat producer to class to talk about the daily routine on a wheat farm.
5. Have students set up a display in the library or media room showing the different stages of wheat. Students may draw pictures of the different stages or acquire samples of wheat in the different stages of growth (clean wheat, sprouting wheat, stalks with wheat heads still attached, wheat with the "trash" still in it). Make the exhibit a self-guided display by having students record messages for each stage.

Name _____

Wheat: From Field to Mill A

Read the paragraphs below, and find the sentence with the main idea. Write the sentence on the lines below each paragraph.

1. Clarence and Susie Coldwater grow winter wheat. They plant their wheat in the fall. It rests during the winter and starts growing again in the spring. In the summer, the Coldwaters harvest their wheat.

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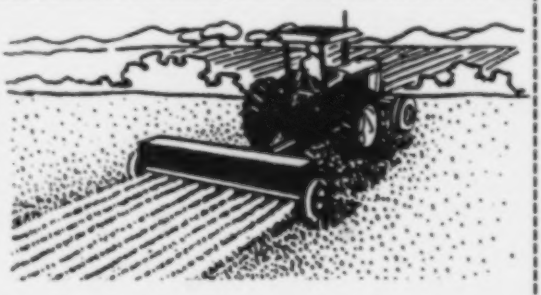
2. Before they plant their wheat, Clarence and Susie must till the fields to get rid of all the weeds. Then they work the soil to break the large clumps into smaller pieces. Getting ready to grow wheat is not an easy job.



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Name _____

Wheat: From Field to Mill B

Read the paragraphs below, and find the sentence with the main idea. Write the sentence on the lines below each paragraph.

3. The winter wheat plant will grow about six inches before the frost comes. It is called winter wheat, because it doesn't die when the weather gets cold. The wheat stops growing, but it stays green. This is called the "dormant period." When the sun warms the soil in the spring, the wheat starts to grow again.

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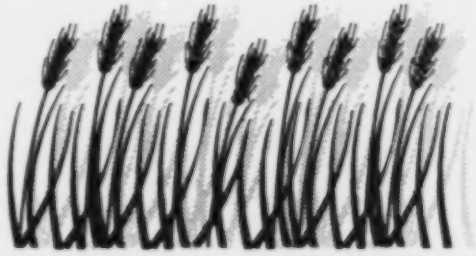

4. In the spring the warm, moist days make the wheat plants grow quickly. As it comes out of its dormant period, more stalks of wheat sprout from the root. This is called "tillering." Each tiller can form a head of wheat.

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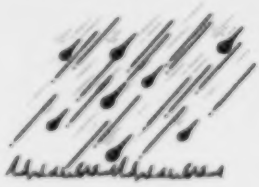
Name _____

Wheat: From Field to Mill C

Read the paragraphs below, and find the sentence with the main idea. Write the sentence on the lines below each paragraph.

5. When the wheat is ready for harvest, Clarence and Susie must race with the weather to get it out of the fields. Some years the wind and rain keep the wheat from getting ripe. Other years hail might break all the heads. One year a lightening storm started a fire and burned their biggest field.



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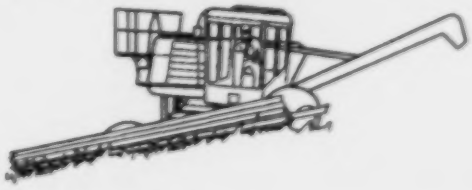
6. The Coldwaters couldn't grow wheat if they didn't have the right kind of machinery. They use a plow and harrow to prepare the field. A grain drill helps them plant the wheat, and they harvest it with a combine. After the wheat is harvested, Clarence and Susie load the wheat on a truck, and haul it to the grain elevator.



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WHEAT: FROM MILL TO OVEN

SUBJECT: Language Arts **GRADE:** 3

AGRICULTURAL TOPIC: Wheat **CONCEPT:** I

STUDENT SKILL
The student will demonstrate appropriate conventions in written composition.

LEARNER OBJECTIVE
The student will practice penmanship skills and find the main ideas of several paragraphs about wheat production.

LESSON

A. Step-by-Step Instructions

1. Bring in a supply of wheat kernels for students to handle and examine. Share the background information.
2. Review with students the method used to identify the main idea of a paragraph.
3. Hand out the student worksheets. Read the directions with your class.
4. After students have completed the assignment, have them cut out the pages and staple them together to make booklets.

B. Background

After wheat farmers have harvested their wheat, they take it to the grain elevator. Sometimes the grain elevator is also a mill. At the mill, huge machines grind the wheat kernels into flour.

First the wheat must be cleaned several times. A series of disks separate the wheat kernels from other weed seeds, dirt and small stones. A giant magnet removes any metal pieces, like nuts or rivets that might have shaken loose from the farm machinery and fallen in with the wheat.

Finally the kernels go into a giant water bath where any remaining stones or other heavy materials drop to the bottom. Light materials float to the top and are washed away. Now the wheat is clean and ready to be milled.

Rollers crack the kernels into smaller pieces. Huge machines shake the wheat pieces through several screens to make the pieces even smaller. If the wheat is to be made into white flour, air currents blow the bran -- the outer layer of the kernel -- away from the rest of the wheat. The wheat bran and germ that have been removed are used in animal feeds.

The pieces are now ready for grinding. Smooth rollers grind the wheat finer and finer. After grinding the wheat is sifted through more screens, sometimes as many as 25 times. Each screen has smaller openings than the one before.

Special ingredients are added to age the flour and whiten it. Vitamins and iron are also added to replace those that have been removed with the wheat germ and bran. Now the flour is ready for baking.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Cross, Verda, *Great-Grandma Tells of Thrashing Day,* Whitman, 1992.
Czermecki, Stefan, *The Sleeping Bread,* Hyperion, 1992.
Johnson, Sylvia, *Wheat,* Lerner, 1990.
Mitgutsch, Ali, *From Grain to Bread,* Carolrhoda, 1981.
Turner, Dorothy, *Bread, Foods We Eat Books,* Carolrhoda, 1989.

Additional Resources

American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

"Everything You Wanted to Know About Wheat," Kansas Wheat Commission, 2630 Claflin Rd., Manhattan, KS 66502-2743 (16-page booklet, including games, craft ideas and art work, explaining the process of wheat production. Free sample to teachers. Thirty cents for multiple copies.)

Honey Bear Bread Box, P.O. Box 44, Dayton, MD 21036 (bread-making kit for up to 28 participants. Kit includes everything but flour, oil and warm water, $29.95, plus 5 percent for shipping and handling.)

Oklahoma Wheat Commission, 800 N.E. 63rd, Oklahoma City, OK 73105.

"Wheat: Field to Oven," Kansas Foundation for Ag in the Classroom, Bluemont 124, Kansas State University, Manhattan, KS 66506 (26-page student activity book, with background material for teachers).

D. Evaluation

Main ideas are as follows: 1. Wheat can be transported in many different ways. 2. At the mill workers test the wheat to decide what kind of flour they can make from it. 3. The wheat must be cleaned several times before it is ground into flour. 4. Now it is time to grind the kernels into flour. 5. After the flour has been ground, workers add the extra ingredients. 6. Wheat can be prepared in many different ways to make nutritious, delicious foods.

E. Related Activities

1. Visit a bakery, and watch the end process of the wheat cycle.
2. Bring samples of white, part whole wheat and 100 percent whole wheat bread to class, and let students taste them to see if they can tell the difference in texture. Bring white flour, whole wheat flour, wheat germ and wheat bran to class for students to examine and compare.
3. Bake bread in the classroom. Use a recipe, and make it from scratch.

Name _____

Wheat: From Mill to Oven A

Read the paragraphs below, and find the sentence with the main idea. Write the sentence on the lines below each paragraph.

1. After wheat is harvested, the farmer must get it to the mill. Wheat can be transported in many different ways. It can be shipped by barges over water. It can be loaded onto rail cars and moved by train, or it can be hauled by trucks along interstate highways.

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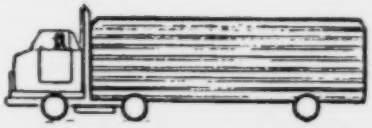

2. At the mill, workers test the wheat to decide what kind of flour they can make from it. If the wheat is soft they use it to make flour that can be used in making cakes and pastries. If it is hard they make flour that keeps well and can be used for making bread. Durum wheat is the hardest kind of wheat. It can be used for making macaroni, spaghetti and noodles.

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Name _____

Wheat: From Mill to Oven B

Read the paragraphs below, and find the sentence with the main idea. Write the sentence on the lines below each paragraph.

3. The wheat must be cleaned several times before it is ground into flour. Several disks separate the wheat kernels from other weed seeds, dirt and small stones. A giant magnet removes any metal pieces that have fallen in with the wheat. Finally the kernels go into a giant water bath. Heavy materials sink to the bottom. Light materials float to the top and are washed away.

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4. Now it is time to grind the kernels into flour. First rollers crack them into smaller pieces. Then the huge machinery shakes them through several screens to make the pieces even smaller. If the wheat is to be made into white flour, air currents blow the bran away from the rest of the wheat. The bran is the outer layer of the wheat kernel. Smooth rollers grind the wheat finer and finer. Then the wheat is sifted through more screens, sometimes as many as 25 times. Each screen has smaller openings than the one before.

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Name _____

Wheat: From Mill to Oven C

Read the paragraphs below, and find the sentence with the main idea. Write the sentence on the lines below each paragraph.

5. After the flour has been ground, workers add the extra ingredients. Some ingredients age the flour. Others whiten it. Vitamins and iron are also added to replace those that have been removed with the wheat germ and bran. Now the flour is ready for baking.

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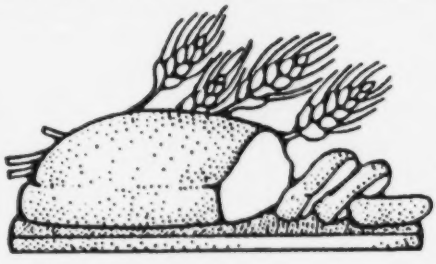
6. People buy the flour from the grocery store and take it home. Sometimes they use it to make birthday cake or cookies for classroom parties. Sometimes they make biscuits or pancakes for breakfast. Sometimes they use it to make bread. Wheat can be prepared in many different ways to make nutritious, delicious food.



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BREAKING THEM DOWN

SUBJECT: Language Arts **GRADE:** 4

AGRICULTURAL TOPIC: Careers **CONCEPT:** VI

STUDENT SKILLS
The student will demonstrate appropriate practices in written compositions.

LEARNER OBJECTIVE
The student will become familiar with several agricultural careers while developing skills using the suffix "er."

LESSON

A. Step-by-Step Instructions

1. Discuss the use of the suffix "er," and have students brainstorm words to which the suffix can be added (swim/swimmer, write/writer).
2. Hand out student worksheets, and review the directions with your students. Read through the root words and definitions. Instruct students to add "er" to each root word to create the job title. Provide dictionaries so students can check spellings of the words.

B. Background

The average person works 2,000 hours a year and 80,000 hours in a lifetime. That means the average person works from the time he or she is 20 until the time he or she is 60, for an average of 40 hours a week, 50 weeks a year. Since you probably will spend the greater part of your adult life working, you may want to familiarize yourself with all kinds of career possibilities.

The largest industry in Oklahoma and in the United States is agriculture. In the past, when people thought of agriculture they thought of farming. But when you talk about agriculture today you're talking about farming as well as all the businesses that provide materials and services to farmers and all the businesses that process, distribute and market agricultural products.

Some examples of jobs tied to agriculture are:

agricultural machinery mechanic
forestry aide
agricultural supplies sales associate
dairy farmer
golf course grounds keeper
game farm manager
vocational agriculture instructor
plant genetics researcher

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Books

Christelow, Eileen, *Mr. Murphy's Marvelous Invention,* Houghton Mifflin, 1983.
Gibbons, Gail, *The Milk Makers,* Macmillan, 1985.
Horwitz, Joshua, *Night Markets: Bringing Food to the City,* Harper Row, 1986.
Imershein, Betsy, *Animal Doctor,* Simon and Schuster, 1988.
Imershein, Betsy, *Farmer,* Simon and Schuster, 1990.
Lasky, Kathryn, *Sugaring Time,* Macmillan, 1983.

Additional Resources

"Business In My Town: Everybody's Business," American Institute of Cooperation, 50 F Street NW, Suite 900, Washington, DC 20001 (a multimedia educational program designed to introduce younger people to organizations that serve their communities).

D. Evaluation

A teacher's answer key is provided.

E. Related Activities

Contact someone in your community who works in one of the career areas discussed. Let them talk to the class about what they do and how it affects others around them.

Name _____

Breaking Them Down

Many job titles end with the suffix "er." When you see an "er" suffix added to a verb it usually describes someone who performs a specific action. Read the agricultural root words in the box on the right, and add "er" to each to form new words in the space provided. ***Challenge: One of the root words needs an extra "e" to form an "er" word. See if you can find the word.*** *Match the words to their definitions. Check your words by looking them up in the dictionary.*

job title	definition
1. farmer	✎ A person who owns or operates a ranch.
2. _____	✎ A person who owns or serves as an officer of a bank.
3. _____	✎ A person who works in, operates or owns a mill.
4. _____	✎ A person who runs or works on a farm .
5. _____	✎ A person trained in forestry.
6. _____	✎ A person who works in a garden.
7. _____	✎ A person who conducts an auction.
8. _____	✎ A person who gathers food to eat.
9. _____	✎ A person who grows or produces goods or services for sale.
10. _____	✎ A person who shears sheep.
11. _____	✎ A person who bakes.
12. _____	✎ A person who hunts for food to eat.
13. _____	✎ A person or machine that harvests a crop.
14. _____	✎ A person who drives a truck.

root words

1. f**A**rm
2. **G**arden
3. gathe**R**
4. auct**I**on
5. produ**C**e
6. h**U**nt
7. mil**L**
8. fores**T**
9. tr**U**ck
10. bank
11. **R**anch
12. shear
13. bake
14. harv**E**st

✱ *Use the upper case letters to complete the sentence below.*

The largest industry in the United States today is __ __ __ __ __ __ __ __ __ __ __ __

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Name _____

Breaking Them Down(Answer Key)

Many job titles end with the suffix "er." When you see an "er" suffix added to a verb it usually describes someone who performs a specific action. Read the agricultural root words in the box on the right, and add "er" to each word to form new words in the space provided. ***Challenge: One of the root words needs an extra "e" to form an "er" word. See if you can find the word.*** *Match the words to their definitions. Check your word by looking it up in the dictionary.*

job title	definition
1. farmer	A person who owns or operates a ranch.
2. gardener	A person who owns or serves as an officer of a bank.
3. gatherer	A person who works in, operates or owns a mill.
4. auctioneer	A person who runs or works on a farm .
5. producer	A person trained in forestry.
6. hunter	A person who works in a garden.
7. miller	A person who conducts an auction.
8. forester	A person who gathers food to eat.
9. trucker	A person who grows or produces goods or services for sale.
10. banker	A person who shears sheep.
11. rancher	A person who bakes.
12. shearer	A person who hunts for food to eat.
13. baker	A person or machine that harvests a crop.
14. harvester	A person who drives a truck.

root words
1. fArm
2. Garden
3. gatheR
4. auctIon
5. produCe
6. hUnt
7. milL
8. foresT
9. trUck
10. bank
11. Ranch
12. shear
13. bake
14. harvEst

* *Use the upper case letters to complete the sentence below.*

The largest industry in the United States today is **A G R I C U L T U R E**.

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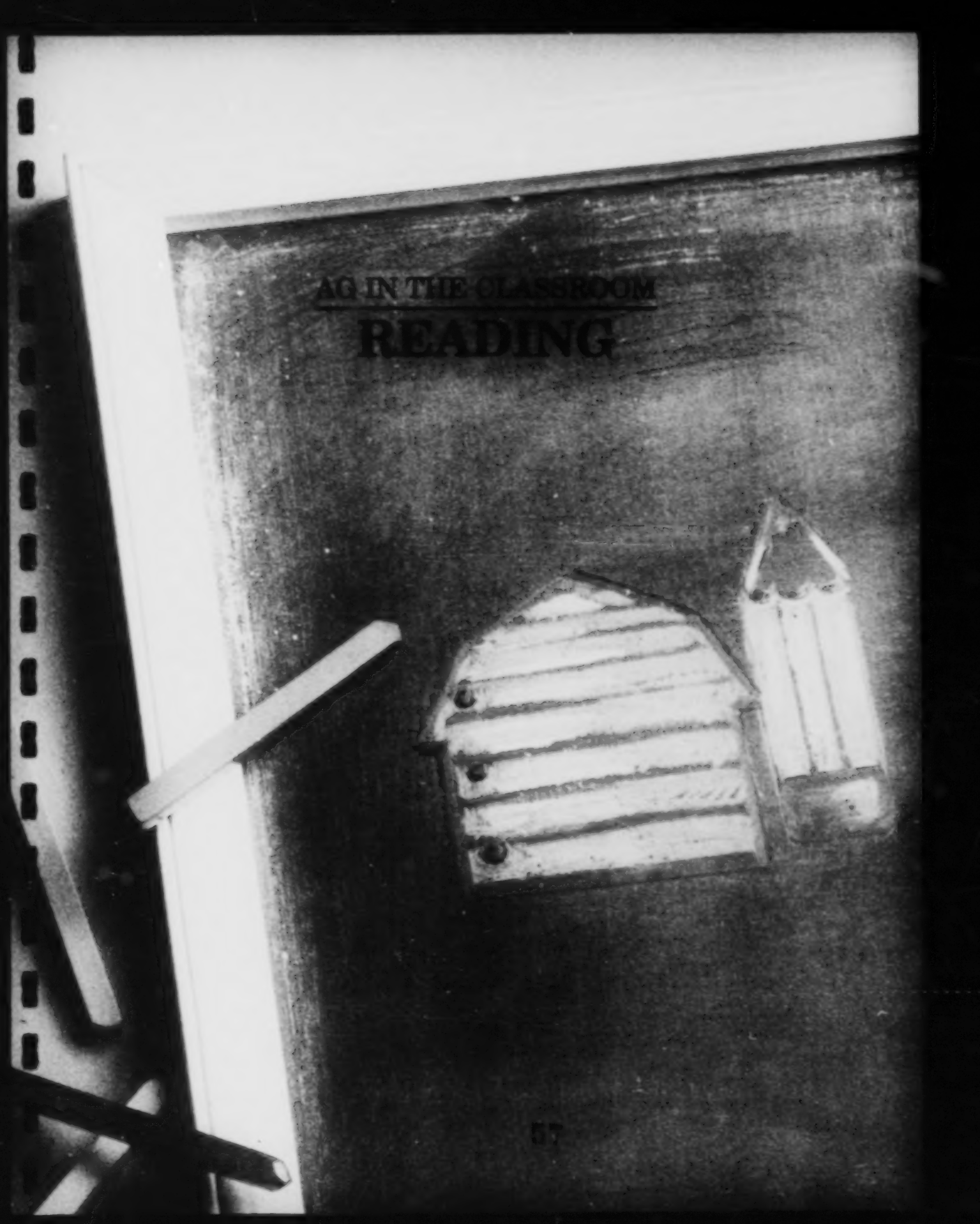
AG IN THE CLASSROOM
READING

FLEECE AS WHITE AS SNOW?

SUBJECT: Reading **GRADE:** 3-4

AGRICULTURAL TOPIC: Sheep **CONCEPT:** I

STUDENT SKILL

The student will expand vocabulary through word study, the reading of literature and class discussion.

LEARNER OBJECTIVE

The students will become familiar with vocabulary words pertaining to the production of sheep.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets. Review and discuss the meaning of the vocabulary words found at the top of the worksheet. Ask students for general definitions, then share the background material.
2. Direct students to read the information on the worksheet silently or read it together as a class. Then have students underline the vocabulary words found in the reading.
3. Using the background information, discuss the meaning of the wool symbol. Have students complete the question at the bottom of the student worksheet.
4. Ask individual class members to use their own words to repeat what they have learned about sheep, using as many of the vocabulary words as possible.

B. Background

Vocabulary

bale - A large bundle of goods, closely pressed and bound together.
breeds - A race or variety of animals similar in most characteristics.
by-product - Something produced in addition to the main product of a raw material.
Dorset - An English breed of sheep that may have large horns or polled horns, close-textured fleece and wool of medium length.
ewe - A female or mother sheep.
fleece - The wool coat worn by sheep.
flock - A group of sheep.
gland - An organ for secreting a substance to be used in or eliminated from the body.
Hampshire - A breed of sheep which are large, thick-muscled and hornless.
lamb - A young sheep, less than one year old, or the meat of a young sheep that is less than one year old.
lanolin - Oil that is in the fleece of sheep.
polled - To cut off or cut short the horns of an animal.
ram - A male or father sheep.
shearing - Cutting off the fleece of the sheep.
stearin - A white solid found in many animal and vegetable fats.
Suffolk - A hornless English breed of sheep, producing excellent meat.
wool - The hair of sheep that is cut off and made into cloth.
yarn - Spun wool that may be used in weaving, in knitting and in the manufacture of thread.

Oklahoma sheep growers sheared 118,000 sheep in 1991. From the

fleece of these sheep, manufacturers produced about 780,000 pounds of wool. Wool can also be made from the hair or fur of goats, rabbits, llamas and even a semi-wild animal from the Andes Mountains call a vicuna. Wool can have a wide range of natural colors and textures, depending on which animal produced the fleece. To help consumers and spinners identify pure wool, the wool industry designed a trademark symbol. The wool symbol can only be used on products made from pure new wool. The wool symbol is used and recognized all over the world.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Carrier, Roch, *Hockey Sweater*, Tundra, 1984.
DePaola, Tomie, *Charlie Needs a Cloak*, Simon and Schuster, 1982.
Dixon, Annabelle, *Wool, Threads Series*, Garrett, 1990.
Emerson, Kathy, *Julia's Mending*, Avon, 1990.
Macaulay, David, *Baaa!*, Houghton Mifflin, 1985.
Mithutsch, Ali, *From Sheep to Scarf*, Carolrhoda, 1981.

Additional Resources

American Sheep Industry Association, 6911 South Yosemite Street, Englewood, CA 80112-1414, (303)771-3500 (fact sheet, wool poster and general information, $5).
American Wool Council, Wool Education Center, 200 Clayton St., Denver, CO 80206.
Oklahoma Sheep and Wool Producers, Attn: Don Chandler, Rt. 2, Box 175, Watonga, OK 73772.
Pendleton Woolen Mills, P.O. Box 3030, Portland, OR 97208-3030 (free wool chart, booklets and wool video for loan).

D. Evaluation

Were the students able to identify and underline the sheep-related vocabulary words in the reading?

E. Related Activities

1. Designate a "wool" day. Encourage students to wear something made of wool to school.
2. Invite a sheep producer to the classroom to explain sheep and wool production.
3. Invite a wool spinner to class to demonstrate spinning wool with a spinning wheel.
4. Acquire enough clean, combed wool to provide each student with a handful. Then show students how they can spin their own wool yarn, using only their fingers. Hold a clean piece of wool in your left hand. Pull out a strip of the wool about one inch wide and thin enough so you can see through the fibers. Roll the strip of wool between your thumb and index finger. Roll the strip only in one direction. Never roll it back and forth. Keep rolling the strip of wool until the fibers wind around each other and form a firm thread of yarn. Wind the yarn around the first two fingers of your right hand. Keep drawing out strips of wool, twisting them tight; then wind the yarn on your fingers. In no time there will be a small ball of "homespun" yarn.
5. Ask students to look for the wool symbol at home, and report where they found them and how many.

Name _____

Fleece as White as Snow?

*Read the story, and underline the **18** vocabulary words. Some words may appear more than once. Only underline that one that appears **first**.*

Vocabulary Words

ewe	wool	ram	Suffolk	flock	bales
breeds	fleece	Hampshire	lambs	shearing	lanolin
glands	yarns	Dorset	stearin	by-product	wool

Mary's Pet

For thousands of years people have depended on sheep to provide them with milk, meat and clothing. Columbus was the first to bring sheep to the New World. Spanish settlers brought large flocks of sheep when they first made their homes in what is now our state of New Mexico.

A female sheep is called a ewe. The male is called a ram. Baby sheep are called lambs. Sheep grow fluffy wool all over their bodies. This coat is called a fleece. The fleece keeps the sheep warm and dry. Sheep need their hair cut about once a year. This is called shearing. It takes about five minutes to shear a sheep. A good sheep shearer can shear about 150 sheep in a day.

After the fleece is sheared, it is weighed and bundled up in bales. Then it is taken to a factory to be sorted and washed. The Mother Goose rhyme tells us Mary's lamb had "fleece as white as snow," but fleece is never that white. Oil in the fleece causes dirt to cling to the coat. For a lamb to look really clean, it would have to be bathed every day.

The oil in the fleece is called lanolin. Lanolin comes from small oil glands found under the sheep's skin. Lanolin glands are similar to the sweat glands you have in your body. Lanolin is used in makeup and lotions. It can also be used to waterproof shoes. We get many other by-products from sheep—leather, waxes for candles, medicines and stearin, which is used to make chewing gum and candy. The inside of a baseball is made by winding 150 yarns of wool into a tight ball.

There are 35 different breeds of sheep in the United States and about 914 different breeds of sheep in the world. Some of the more popular breeds of sheep are Suffolk, Hampshire and Dorset.

Complete this sentence: The wool symbol means _____

The Wool Symbol

_____

_____

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GOODNESS, GRADY!

SUBJECT: Reading **GRADE:** 3

AGRICULTURAL TOPIC: Animal Nutrition **CONCEPT:** III

STUDENT SKILL
The student will respond to literature through discussion, dramatization, art, writing and reading other books.

LEARNER OBJECTIVE
The student will be involved in the presentation of a play.

LESSON

A. Step-by-Step Instructions

1. Read "The Story of Grady, the Cow" to students, and share the background material.
2. Hand out copies of the play, "Goodness, Grady!" and assign parts. Practice reading the play aloud.
3. Have the students create sack puppets, using the puppet patterns found in the pattern page section of the book.
4. Invite other classes in to watch the play.

B. Background

A silo is the tall building you sometimes see on old farms that looks something like a rocket. In the past, farmers used silos to make silage, which they fed to their animals. The farmer makes silage, or pickled grass, by chopping fresh, green plants (alfalfa, corn, grass) and storing it in a place where no air can get in. This allows the plants to ferment.

Farmers have to be as concerned that their animals eat the right kinds of foods as your parents are about the foods you eat. And it's not enough just to put nutritious food in front of the animal. The food has to be something the animals can digest easily. If the food is difficult to digest, the animal may not keep all the nutrients in its body. Some foods are easier for the animals to digest when they are fermented. We humans eat many fermented foods, too. Cheese and yogurt are made from milk which has been fermented. Fermentation is what makes bread rise. The yeast ferments natural sugars in the flour and sugars that are added. The bread dough rises because of small bubbles of carbon dioxide gas which form during fermentation.

These days most silos are pits dug in the ground. They are covered with flexible plastic sheets to create an environment that is nearly air-tight. That allows the fermentation process to begin. On a windy day, the smell from the storage pit can be very strong.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Enright, Elizabeth, *Thimble Summer*, Dell, 1987.
King, P.E., *Down on the Funny Farm*, Random House, 1989.
Lindburgh, Reeves, and Susan Jeffers, *Benjamin's Barn*, Dial, 1990.
Martin, Bill, and John Archambault, *Barn Dance*, Holt, 1986.
Noble, Trinka Hakes, *Meanwhile, Back at the Ranch*, Dial, 1987.

Additional Resources

Noble C. Fry Public Library, 500 W. Main, Yukon, OK 73099, Sue Kilmer, librarian (more information on Grady, the Cow).

"My Family Farm," Illinois Farm Bureau, Field Services Division, 1701 Towanda Ave., Bloomington, IL 61701 (bulletin board kit for grades 1-3, $4.75).

D. Evaluation

Did students enjoy performing the play and creating their own puppets?

E. Related Activities

1. Have students bring cylindrical-shaped containers to create their own silos. Some products that can be used for the silos are potato chip cans, oatmeal boxes or coffee cans. Provide a variety of materials for students to use in designing their own silos (burlap, aluminum foil, small stones and clay, tongue depressors, popsicle sticks or pretzels to represent wooden silos).
2. Conduct a silo show. Have students enter their "silos" into different categories (most colorful, most traditional, largest, etc.). Invite another class in to view the class silo show. Serve punch and cookies from silo cookie cans. Have students share information about silos.

Ernest Berousek
Sue Kilmer

Yukon Becomes Famous with Grady, the Cow

Yukon was a little town in 1949. Probably very few people knew about it outside of Canadian County and Oklahoma. But in February of that year, the town of Yukon made headlines across the United States, because it was the home town of a cow with an interesting problem.

Grady, a Hereford cow weighing 1,400 solid pounds, had just given birth to a dead calf. In her confusion she became so startled that she leapt through a small opening in a nearby silo. The hole that Grady went through so suddenly and successfully measured only 17.5 inches by 25.5 inches. If Grady's owner, Bill Mach, hadn't been there, he would never have believed the cow could have managed the act.

Now Farmer Bill really had a problem--how to get Grady out of the silo. Both the cow and the silo were too valuable to lose. The structure of the silo, with the opening encased in steel, did not allow for any widening of the hole. Nor could Grady be made any narrower. What to do? Bill Mach requested help, and local and distant newspapers picked up the S.O.S.

Even more amazing than the fact that Grady had gotten into the silo was the response Bill received from people with ideas to help free the cow from the silo, which had become a 16-foot cell. Calls and telegrams poured in from St. Louis, Denver, Chicago, San Antonio, Des Moines, and even Canada. Some of the suggestions were: use a helicopter to lift Grady out; bring an attractive bull near to lure Grady out; fill the silo with water and float the cow to the top.

Help is on the way!

The winning suggestion came from Ralph Partridge, farm editor of the *Denver Post,* who not only made the suggestion but flew to Yukon to carry out his idea of greasing Grady's body, sedating her, and then pulling and pushing her through the opening. It worked! After a five-day stay in the silo, Grady was free.

The fame of Grady, the cow, continued. *Yukon Sun* editor, Bob Park, renamed his editorial column "Down by the Silo" in her honor. A local merchant used the Grady incident as an advertising notion, claiming "Don't let your cow jump into your silo. But, in case she does, remember this is the place to get your grease!"

Grady also attended the Oklahoma State Fair and was quite a drawing card for the fair and for the town of Yukon. People would go to the fair to see Grady and take her picture. Then they would travel to Yukon to photograph the silo in which she was trapped.

In addition, a children's book called *The Cow in the Silo* was published. The book was based on Grady's story and became very popular.

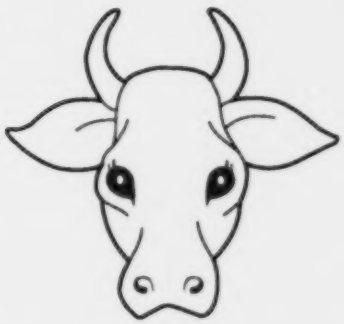
Grady took her nation-wide publicity and sudden fame very calmly. She lived until she was 18 years old. When she died, in 1961, her story once again made front-page coverage in the newspapers.

As for the well-known silo, it still stands as a remembrance of the event. It is located on the west side of Highway 92 and can be easily seen south of the I-40 overpass. The farmstead has been removed, and the silo stands alone. Grady's owners, the Bill Mach family, now live some distance from the silo.

Clarence Wright, the current owner of the property, intends to leave the silo as it is. Since the silo is now located in a choice commercial area, maybe someday a restaurant or other public structure will be built at the silo site, and people will look out the window and wonder, "How did Grady, the cow, ever go through that small opening?"

Name _____

Goodness, Grady!



Cast of Characters

Narrator
Grady, the Cow (puppet)
Grady, the Cow (voice)
Henry, the Horse (puppet)
Henry, the Horse (voice)
Percy, the Pig (puppet)
Percy, the Pig (voice)
Lacey, the Lamb (puppet)
Lacey, the Lamb (voice)

Setting: The grain silo on the Bill Mach Farm in Yukon, Oklahoma.

Narrator.....Grady, the Cow, has just given birth to a calf. The calf is dead. Grady is confused and very upset. While Bill Mach, her owner, has his back turned, Grady jumps into Bill's silo. Bill is amazed when he realizes what she has done. Grady is a very large cow, and the silo opening is very small. In fact, it is only 17 1/2 inches wide and 25 1/2 inches tall.

Narrator holds up a 17 1/2- by 25 1/2-inch window made of construction paper .

Narrator.....Now Grady, the Cow, cannot get out. But, wait. Here comes Henry, the Horse. Maybe he can help. Let's listen.

Grady, the Cow.....Moo *(in much pain)* ! Help! Henry, the Horse, I need some help!

Henry trots toward the silo.

Henry, the Horse..... My Goodness, Grady (imitating a horse sound)! How did you get in such a mess?

Grady, the Cow.....I was so unhappy that my baby died, I accidentally jumped through the opening in the silo. Moo-hoo! Moo-hoo!

Henry, the Horse..... Well, turn around, and I'll pull you out by your tail.

Grady turns around. Henry pulls, but nothing happens.

Grady, the Cow..... Moo-hoo! This will never do!

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Percy, the Pig, comes along , on the way to his mud hole.

Henry, the Horse, and Grady, the Cow.....Percy Pig ! Come quickly! We need your help!

Henry, the Horse..... Grady is stuck. She can't get out of the silo!

Percy lumbers over.

Percy, the Pig..... *(snorts)* Let me see. I'll crawl in the silo with Grady. I could get a better look at the problem. Oink! Oink *(speaks with a labored sound, as though trying to squeeze through the silo opening)!*

Grady, the Cow Percy, it's no use. You are too fat to even get through the opening. Moo-hoo (*crying).* I'll be stuck here forever.

Narrator It seems like the farm animals have a real problem on their hands. This might be their last chance. Here comes Lacey Lamb. Maybe she can solve this problem.

Lacey Lamb prances through the barnyard.

Lacey, the Lamb (*speaking in a sweet tone)* Why is Grady stuck in Farmer Bill's silo? Can she not get out?

Percy, the Pig, Henry, the Horse and Grady, the Cow... NO! And we need your help!

Percy, the Pig We've tried everything.

Lacey, the Lamb That's too bad! But I have an idea. My coat of wool produces a kind of oil called lanolin. We can use my lanolin to grease up Grady. Then maybe she will slip through the opening.

The animals gather around Grady.

Lacey, the Lamb Henry, the Horse and Percy, the Pig.....One, two, three . . . PULL!

Grady pops out, tired and very hungry, but unharmed. A cheer goes up from the animals.

Narrator..... The moral of the story is: Look before you leap!

BUILD A BURGER

SUBJECT: Reading GRADE: 3

AGRICULTURAL TOPIC: Beef CONCEPT: II

STUDENT SKILL
The student will use functional print to accomplish tasks.

LEARNER OBJECTIVE
Students will recognize and name the products used to build a hamburger.

LESSON

A. Step-by-Step Instructions
1. Share background material.
2. Hand out student worksheet A. Have students match the clues to the products used in making hamburgers.
3. Hand out student worksheet B. Have students match the burger parts to the picture parts.

B. Background

Which food group does a hamburger belong to? Depending on what you like on your burger, it could have something from every food group. What do you like on your hamburger? What food group does it come from?

Most hamburgers consist of ground beef and some kind of bread, but there are other kinds of burgers, too. What animal do you think a porkburger comes from? What about a lambburger or a buffaloburger? Some burgers are even made without meat. Have you ever heard of a soyburger? It's made from ground soybeans which have been mixed with other ingredients, shaped, cooked and flavored so it tastes almost like a hamburger.

Ground beef can be made from just about any part of the beef animal. Ground round or ground sirloin have the least amount of fat. The next time you go shopping with your mother or father, pay attention to the different kinds of ground beef at the meat counter. The average hamburger patty contains between 16 and 19 grams of fat. Your hamburger will have more fat if you add cheese and even more if you use mayonnaise. Using low-fat cheese and mustard or catsup will help keep the fat content down.

Ground beef is high in protein, containing eighteen amino acids - eight that are essential for human life. Niacin, vitamin B12, thiamin, and zinc are other vitamins and minerals provided by a beef patty. You can make your hamburger even more nutritious by choosing different breads and condiments. Whole wheat buns add nutritional value. Raw spinach, or bean or alfalfa sprouts can be added to your burger for good nutrition and a new taste.

The average American eats about 64 pounds of beef each year, more than the people of any other country in the world. Nearly one-half of that comes from ground beef and about one-fourth is in the form of hamburgers.

Source: Oklahoma Cooperative Extension Service, Nutritional Sciences, OSU

C. Resources

Books

Barrett, Judi, *Cloudy, With A Chance of Meatballs,* Macmillan, 1978.
Carle, Eric, *The Very Hungry Caterpillar,* Putnam, 1991.
Howe, James, and Deborah Howe, *Bunnicula: A Rabbit Tale of Mystery,* Avon Camelot, 1979.

Additional Resources

American National Cattlewomen, P.O. Box 3881, Englewood, CO 80155 (brochure on beef by-products, ten cents each).

DuPont Company Graphics Center, 1515 South Garnet Mine Road, Boothwyn, PA 19061 (free "Food for Thought" placemat, with facts and a quiz on food consumption and technology).

D. Evaluation

Correct answers for student worksheet A are as follows: 1. bun; 2. cheese; 3. ketchup; 4. mayonnaise. Correct answers for student worksheet B are as follows, from top to bottom: bun/bread, cereal, rice, pasta; lettuce/vegetables; pickles/vegetables; onion/vegetables; cheese/milk, yogurt, cheese; ground beef/meat, poultry, fish, dry beans, eggs and nuts; mustard/fats, oils, sweets; bun/ bread, cereal, rice, pasta.

E. Related Activities

1. Conduct a taste test on samples of the products that make up a hamburger. Set up booths and have another class come in and taste the products. Instruct students to wash hands and prepare samples. Have three types of buns available (whole wheat, white, sesame seed), three kinds of cheese (American, Swiss, Cheddar), etc. Have the visiting students rate products according to which they like best, second best and least. Have students compile the data and graph the results.
2. Bring in a calorie guide. Have students list all the things they like on their hamburgers. Help students look up the hamburger parts and add them up to find out the total calorie count of each of their burgers. Have students share the information.
3. Have the class plan a menu with the hamburger featured as the main component. Submit the menu to the school dietitian for approval, and lobby to have it put on the school menu. If possible ask for help from the cafeteria staff.
4. Have a hamburger-tasting party. Ask parents to help provide a variety of ingredients, so students can build healthburgers. Invite a nutritionist to act as judge, and give a prize for the healthiest burger.

Name _____

Build a Burger

A

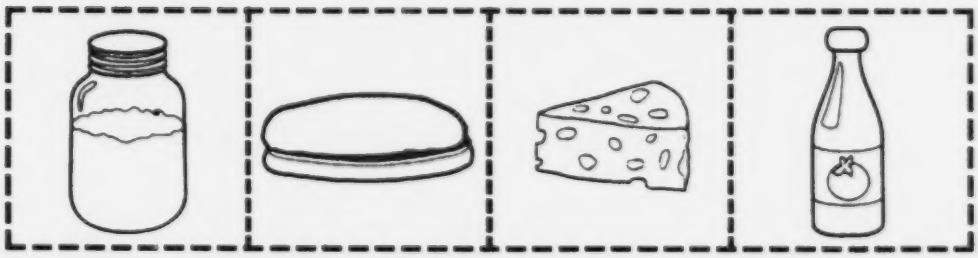
Read the recipes on the recipe cards. Cut out the burger parts pictured below and match them to the correct recipe. Paste the burger parts in the boxes.

1. Mill wheat into flour. Mix the flour with yeast, water and other ingredients. Bake the dough in an oven. Put it in a package and place it on a shelf at the grocery store to sell.

2. Add a culture to milk to separate it into curds and whey. Pour off the whey and press the curds together. Add flavorings or spices, if desired. Age the solid block to allow the flavor to develop.

4. Crush soybeans to remove their oil. Carefully mix the soybean oil with eggs, spices and other ingredients to make a white topping you can spread with a knife. Seal it in jars and send it to the supermarket.

3. Cook tomatoes into a sauce. Add spice and flavorings. Pour it into a bottle and send it to the supermarket.



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Name _____

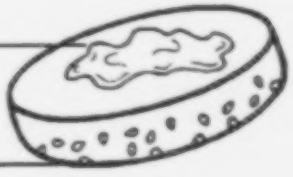
Build a Burger B

A cheeseburger usually has products from all the food groups. Can you identify the parts of this cheeseburger? In the left blank write the name of the cheeseburger part. In the right blank, list the food group to which it belongs. Then color your cheeseburger.

bun / bread, cereal, rice, pasta

Word Bank
Onion
Cheese
Bun
Lettuce
Mustard
Pickle
Ground beef

Food Groups
- Fats, oils, sweets
- Milk, yogurt, cheese
- Meat, poultry, fish, dry beans, eggs and nuts
- Vegetables
- Fruit
- Bread, cereal, rice, pasta



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THE BRAND OF HISTORY

SUBJECT: Reading **GRADE:** 4

AGRICULTURAL TOPIC: Beef **CONCEPT:** III

STUDENT SKILL

The student will identify technical and specialized terms and determine meanings of multiple meaning words using a variety of strategies.

LEARNER OBJECTIVE

The student will learn the history and purpose of branding cattle.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets.
2. Have students read student worksheet A to themselves or take turns reading it aloud.
3. Have students answer the questions on student worksheet B, working either individually or as a class.

B. Background

In Oklahoma, the beef business is big, with 60,000 producers and 5 million cattle. Oklahoma beef sales come to about $2 billion a year. Oklahoma ranks fifth in the nation in the production of cattle. Texas is the number one cattle-producing state in the United States.

A registered livestock brand that is easy to read is a cow's only "return address." Registered Oklahoma brands are recorded by the Oklahoma Cattlemen's Association, an organization made up of Oklahomans involved with beef production, marketing and distribution.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Clifford, Edith, *The Dastardly Murder of Dirty Pete*, Houghton Mifflin, 1981.
Erickson, John R., *Hank the Cow Dog: The Case of the Hooking Bull*, Gulf, 1992.
Freedman, Russell, *Cowboys of the Wild West*, Houghton Mifflin, 1985.
Gorsline, Marie, and Douglas Gorsline, *Cowboys*, Random House, 1978.
Khalsa, Dayal, *Cowboy Dreams: Do You Know?* Crown, 1990.

Additional Resources

American Brahman Breeders Association, 1313 La Concha Ln., Houston, TX 77054.
Oklahoma Beef Industry Council, 5101 N. Classen, Ste. 210, Oklahoma City, OK 73118.
"Twelve Myths and Facts," National Cattlemen's Association, 5420 S. Quebec St., Englewood, CO 80155 (videotape for grades K-3 and 4-6, $15).
Oklahoma Cattlemen's Association, 2500 Exchange, Oklahoma City, OK 73108, (405) 235-4391.

D. Evaluation
An answer key is provided.

E. Related Activities
1. Have students gather facts from resource materials listed above. Then have them record the facts on the line drawing of a cow found in the pattern pages to create a classroom display.
2. Invite a local rancher in to discuss the branding process and show the instruments used in branding.
3. Review *The Oklahoma Brand Book*, available from your county Extension office. This book has a record of all registered brands in Oklahoma.

Name _____

The Brand of History

A

Read the story on student worksheet A, and answer the questions on student worksheet B.

Ranchers in the American West branded their cattle to keep **cattle rustlers** from stealing them. If the cattle were stolen, the brand would prove who the real owner was. Since there were no fences on the American Plains in those days, branding was also a good way for ranchers to know their own cattle from those of other ranchers.

In Texas there was at least one rancher who didn't like to brand his cattle. His name was Sam Maverick. Many of his cattle were stolen or wandered away. Since they had no brands, no one knew who owned them. That was how unbranded cattle came to be known as **mavericks.**

Ranchers today still brand their cattle to protect them from rustlers. Fences keep one rancher's cattle separated from another's now, but brands help identify them in case they get outside the fence or mingle with another herd.

A rancher must register his or her brand in the state where he or she first started using it. A brand is considered property and can be inherited or passed down in a family.

A ranch can have more than one brand, but they must all be registered. The location of the brand on the animal's body will be the same for every animal that belongs to that ranch. It may be on the animal's hindquarters, shoulder or side. The brand never disappears and can even be seen in the hide after the animal is butchered.

Branding irons are formed from steel and placed on long handles. The branding iron is heated until it turns an ash color. Then it is pressed into the hide of the calf long enough to burn through the hair and the outer layer of skin. Some modern branding irons are electric, with plastic grip handles.

Horses can be branded on the cheek, shoulder or rump, but branding is not as common in the horse industry as it is in the cattle industry. Branding "irons" for sheep are carved from wood or molded from metal and dipped in paint, so the wool and hide will not be ruined. As soon as the wool is sheared, the sheep must be branded again.

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Name _____

The Brand of History B

Use the story on student worksheet A to answer the questions below. Answer the questions in complete sentences.

1. Why are cattle branded?

2. What is a cattle rustler?

3. In what part of the U. S. was cattle branding popular?

4. Why are unbranded cattle called "mavericks?"

5. A brand belongs to only one person and no one else. True or False.

6. List the three places a cow can be branded.

7. A cattle brand never disappears. True or False. Why?

8. List two other animals that can be branded.

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Name _____

The Brand of History (Answer Key)

Use the story on student worksheet A to answer the questions below. Answer the questions in compolete sentences.

1. Why are cattle branded? **Cattle are branded to show ownership.**

2. What is a cattle rustler? **A person who steals cattle is called a cattle rustler.**

3. In what part of the U. S. was cattle branding popular? **Cattle branding was popular in the American West and the Plains.**

4. Why are unbranded cattle called "mavericks?" **Unbranded cattle were named after a man who would not brand his cattle. His name was Sam Maverick.**

5. A brand belongs to only one person and no one else. True or False. **False. A brand is considered property. It can be passed down in a family.**

6. List the three places a cow can be branded. **A cow can be branded on the hind quarter, the shoulder or the side.**

7. A cattle brand never disappears. True or False. Why? **True. A brand is like a scar.**

8. List two other animals that can be branded. **Horses and sheep can be branded.**

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FROM BOLLS TO BOLTS

SUBJECT: Reading **GRADE:** 4

AGRICULTURAL TOPIC: Cotton **CONCEPT:** IV

STUDENT SKILL

The student will recognize and interpret relationships in text such as compare/contrast, cause/effect, problem/solution and sequential order.

LEARNER OBJECTIVE

The student will become familiar with the process involved in manufacturing cotton cloth.

LESSON

A. Step-by-Step Instructions

1. Ask your county Extension office to help you acquire some cotton bolls, and bring them to class. Show the cotton bolls to your students, and have them guess what they are and what they are for. Let students feel the cotton and try to pull the cotton lint from the cotton boll.
2. Bring a variety of articles to class that were made from cotton (cotton balls, a cotton shirt, a pair of jeans, cotton embroidery or crochet thread, cotton swabs, towels). Share the background material.
3. Discuss time order words with your students. Hand out student worksheets. Instruct students to read the sentences on the worksheet and place them in the proper order, using the time order words as clues.

B. Background

Cotton farmers plant cotton in the late spring. They use mechanical planters that can plant seed in as many as eight rows at a time. During the growing season scouts go out into the fields to count harmful insects. If there are too many, the farmer will use pesticides to control them.

About two months after planting, flower buds, called ***squares****, appear on the plant. Three weeks later the blossoms open. The petals change colors as they mature. First they are creamy white. Then they turn yellow, then pink, and, finally, dark red. After three days the red flowers wither and fall, leaving green pods called* ***cotton bolls****.*

The boll is shaped like a tiny football. Moist fibers grow and push out from the newly-formed seeds. As the boll ripens, it turns brown. The fibers continue to expand in the warm sun. Finally they split the boll apart, and the fluffy cotton bursts out.

Cotton is harvested in the fall. Most of the cotton is harvested by machine. After the cotton is harvested it is stored at the edge of the field in big mounds or loaded on trailers or trucks and carried to the ***cotton gin****.*

At the cotton gin powerful pipes suck the cotton into the building and through cleaning machines that remove burs, dirt and leaf trash. Then circular saws with small, sharp teeth pull the ***fiber*** *from the seed. The ginned fiber is called* ***lint****. The lint is pressed into 480-pound bales, about the size of a refrigerator.*

The bales are sold to cotton merchants who sell them to ***textile*** *mills in the U.S. or in foreign countries. At the textile mills huge machines spin the cotton fibers into cotton thread. The thread is then woven into cloth on* ***looms****. The rolls of cloth that come off the looms are called* ***bolts****. Clothing manufacturers buy bolts of cloth and cut jeans, shirts, dresses and other items of clothing from them to sew.*

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Migutsch, Ali, *From Cotton to Pants,* Carolrhoda, 1981.
Miles, Betty, *Secret Life of the Underwear Champ,* Knopf, 1981.
Monsell, Mary, *Underwear!* Albert Whitman, 1988.
Selsam, Millicent E., *Cotton,* William Morrow, 1982.
Ushinsly, Konstantin, *How a Shirt Grew in the Field,* Clarion, 1992.
Williams, Shirley Anne, *Working Cotton,* Harcourt, Brace, Jovanovich, 1992.

Additional Resources

"The Story of Cotton," National Cotton Council, Communications Service, P.O. Box 12285, Memphis, TN 38182 (classroom packet with cotton sample, film strip, informational booklet and a wall chart on cotton, $15, including postage).

D. Evaluation

An answer key is provided.

E. Related Activities

1. Purchase unbleached muslin at a fabric store. If possible, buy the end of a bolt, and bring it to class so students can see what a bolt of cloth looks like. Have students tear the cloth into bandanna-sized squares to tie-dye. Show students how to tie up the cloth to create designs. The cloth may be knotted, rolled, twisted, folded or bunched. Tie the cloth as tightly as possible so the dye will not soak inside. Purchase commercial dye, and follow the instructions on the package. Dip the cloth into the dye, and stir gently. The longer you leave the cloth in the dye, the darker the color. Take the cloth out of the dye, and rinse it thoroughly in cold water. Untie the cloth, and rinse again. Squeeze out the excess water, and drain the cloth on newsprint that has been spread flat. Display the creations, using clothes pins and clothes line stretched along the hallway or across the classroom.

Name _____

From Bolls to Bolts

Words like "first," "next," "then," and "last" are order words. Order words show where the sentence goes in the paragraph. They are often used in directions or in recipes. Number the following sentences to show their order. Put your numbers inside the cotton bolls. Then write the paragraph on the lines at the bottom of the page. Don't forget to indent.

At the gin, saws with sharp teeth pull the fibers from the seed.

Second, the cotton fiber bursts open.

Now the thread is woven into cloth.

Finally, the bolts are cut into jeans, shirts, dresses, towels and many other things to sew.

First, the farmer plants the cotton and waits for it to grow.

At the textile mill, fibers are spun into cotton thread.

Next, the farmer loads the cotton into a truck and takes it to the cotton gin.

After that, the cotton is pressed into bales.

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Name _____

From Bolls to Bolts (Answer Key)

Words like "first," "next," "then," and "last" are order words. Order words show where the sentence goes in the paragraph. They are often used in directions or in recipes. Number the following sentences to show their order. Put your numbers inside the cotton bolls. Then write the paragraph on the lines at the bottom of the page. Don't forget to indent.

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At the textile mill, fibers are spun into cotton thread.

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After that, the cotton is pressed into bales.

First, the farmer plants the cotton and waits for it to grow. Second, the cotton fiber bursts open. Next, the farmer loads the cotton into a truck and takes it to the cotton gin. At the gin, saws with sharp teeth pull the fibers from the seed. After that, the cotton is pressed into bales. At the textile mill, fibers are spun into cotton thread. Now the thread is woven into cloth.

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RIDE THE WILD LEAF CYCLE

SUBJECT: Reading **GRADE:** 4

AGRICULTURAL TOPIC: Forestry **CONCEPT:** IV

STUDENT SKILL

The student will recognize and interpret relationships in text, such as compare/contrast, cause/effect, problem/solution and sequential order.

LEARNER OBJECTIVE

The student will learn that leaves in the forest provide food for new trees and other plants.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets, and share background material.
2. Have students read about the leaf cycle on worksheet A and look at the picture on worksheet B.
3. Instruct students to cut out the leaves on student worksheet A and glue them over the appropriate number on student worksheet B.

B. Background

Vocabulary

decomposer - An organism that breaks dead plants and animals down into simple inorganic elements which can be returned to the atmosphere and soil.
ecology - The science of relationships between organisms and their environments.
inorganic - Having to do with things not usually classified as organic.
mineral - A solid, inorganic material that occurs naturally in the earth's crust.
nutrient cycle - The process by which organisms that die feed organisms that are alive so those organisms can produce new organisms and then, in turn, die to feed the new organisms.
organic - Having to do with living things.
organism - A living plant or animal.
understory - The layer of decomposed and decomposing leaves on the forest floor.

We are part of a living and dying world. Plants and animals are born, grow older and die. Other plants and animals take their places. As each living thing dies, it decays and returns to the soil. One plant's death may make it possible for new plants to grow where they could not grow before. This is called ***ecology****.*

Leaves that fall to the ground in the autumn are a very important part of the forest ecology, or ***nutrient cycle****. The leaves lie on top of others that fell in previous years. This is called forest litter, or the* ***understory****. Winter rains and snows keep the leaves wet so the* ***decomposers*** *can do their work. The decomposers are tiny* ***organisms*** *living under the piles of leaves, in the dirt. Some of them are so small you can't see them without a microscope. You are seeing thousands of decomposers all massed together when you see fungus and mold. The decomposers release* ***minerals*** *from the dead leaves into the soil. In the spring, new plants use those minerals to grow new leaves.*

Source: Oklahoma Cooperative Extension Service, Forestry, OSU

C. Resources

Books

Bourgeois, Paulette, *The Amazing Dirt Book*, Addison-Wesley, 1990.
Buscaglia, Leo, *The Fall of Freddie the Leaf*, Charles B. Slack, 1982.
Cobb, Vicki, *Lots of Rot*, Harper Collins, 1981.
Dickinson, Jane, *All About Trees*, Troll, 1983.
Hughey, Pat, *Scavengers and Decomposers: The Cleanup Crew*, Atheneum, 1984.
Thornhill, Jan, *A Tree in a Forest*, Simon and Schuster, 1992.

Additional Resources

Soil Conservation Service, USDA, P.O. Box 2890, Washington, DC 20013.

D. Evaluation

Students should glue leaves in the following order: 1. "Dead leaves fall to the ground;" 2. "Decomposers break down the leaves;" 3. "Water and air penetrate the soil;" 4. "Rocks break up into tiny particles;" 5. "The decomposed leaves release nutrients into the soil;" 6. "New trees and other plants grow. New leaves grow on old trees."

E. Related Activities

1. Ask your custodial staff to let your students rake leaves in the fall and make a large pile in an area where they won't be disturbed. Have students dig into the pile periodically throughout the year and record the changes they see.
2. Have students collect different kinds of leaves in the fall and make leaf rubbings. Students should peel the paper from color crayons and use them to make rubbings on white sheets of paper placed over the leaves.
3. Make a class notebook. Provide students with reference books and divide them into groups of four or five. Have the groups identify all the different kinds of leaves they have collected. Each group should be responsible for one page on which to identify the leaf and write information about the tree (where it is located, growth habits and any other information the groups can find). Laminate the pages with the appropriate leaf attached to each one. Bind the book with yarn strung through holes punched on the left side.
4. Provide a microscope for students to examine the molds and fungus growing on the leaves in their leaf pile.

Name _____

Ride the Wild Leaf Cycle A

Read the story about the leaf cycle. Then number the pin oak leaves to show the correct order of steps in the leaf cycle. Color the leaves in autumn colors.

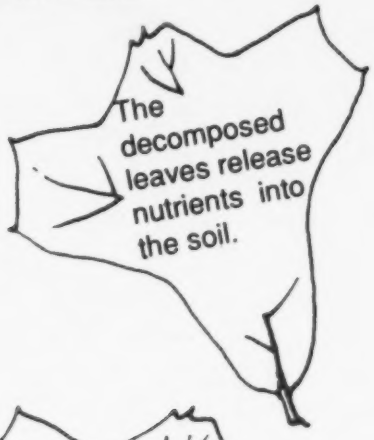
The Leaf Cycle

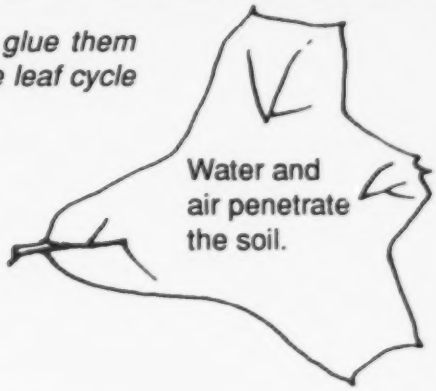
What happens to the leaves when they fall to the ground in the autumn? In the forest they go for a ride on the leaf cycle.

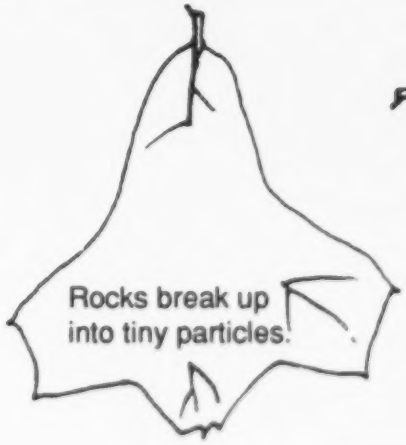
After the leaves fall to the ground, decomposers go to work, breaking the leaves down into food for the soil. Rain and snow help the decomposers do their work. Air enters the soil to do its part. Minerals for the soil come from rocks buried deep beneath the forest floor. Over hundreds of years, the rocks break up into tiny particles.

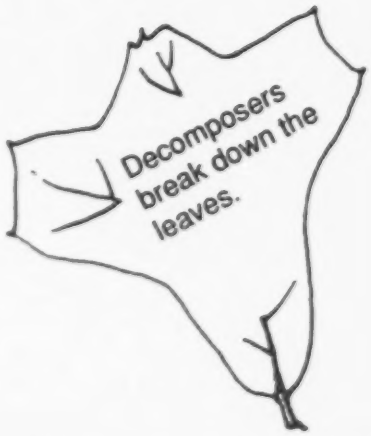
The decomposers release nutrients from the leaves into the soil. The soil becomes food for new plants and trees. It helps the old trees grow new leaves in the spring. Those leaves fall to the ground in the autumn, and the leaf cycle keeps on turning.

Cut the leaves out, and glue them where they belong on the leaf cycle on worksheet B.









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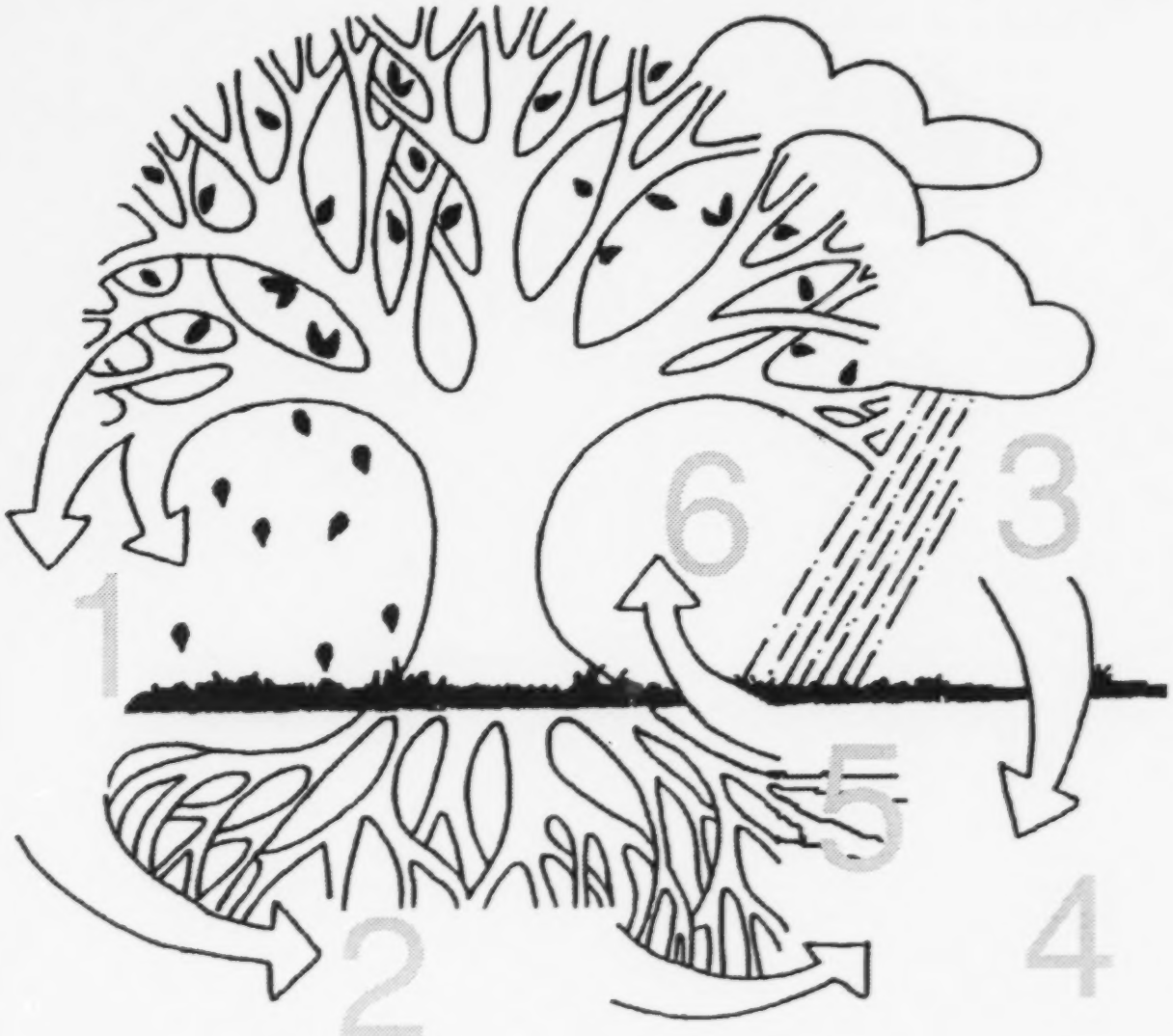
Ag in the Classroom

Name _____

Ride the Wild Leaf Cycle B

Color the picture. Cut out the leaves from student worksheet A ,and glue them over the correct number below. You may turn the leaves any way you wish to make them fit.



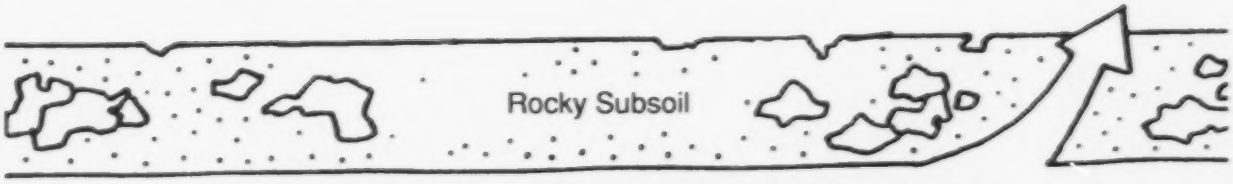


Illustration adapted from a lesson by the USDA Soil Conservation Service

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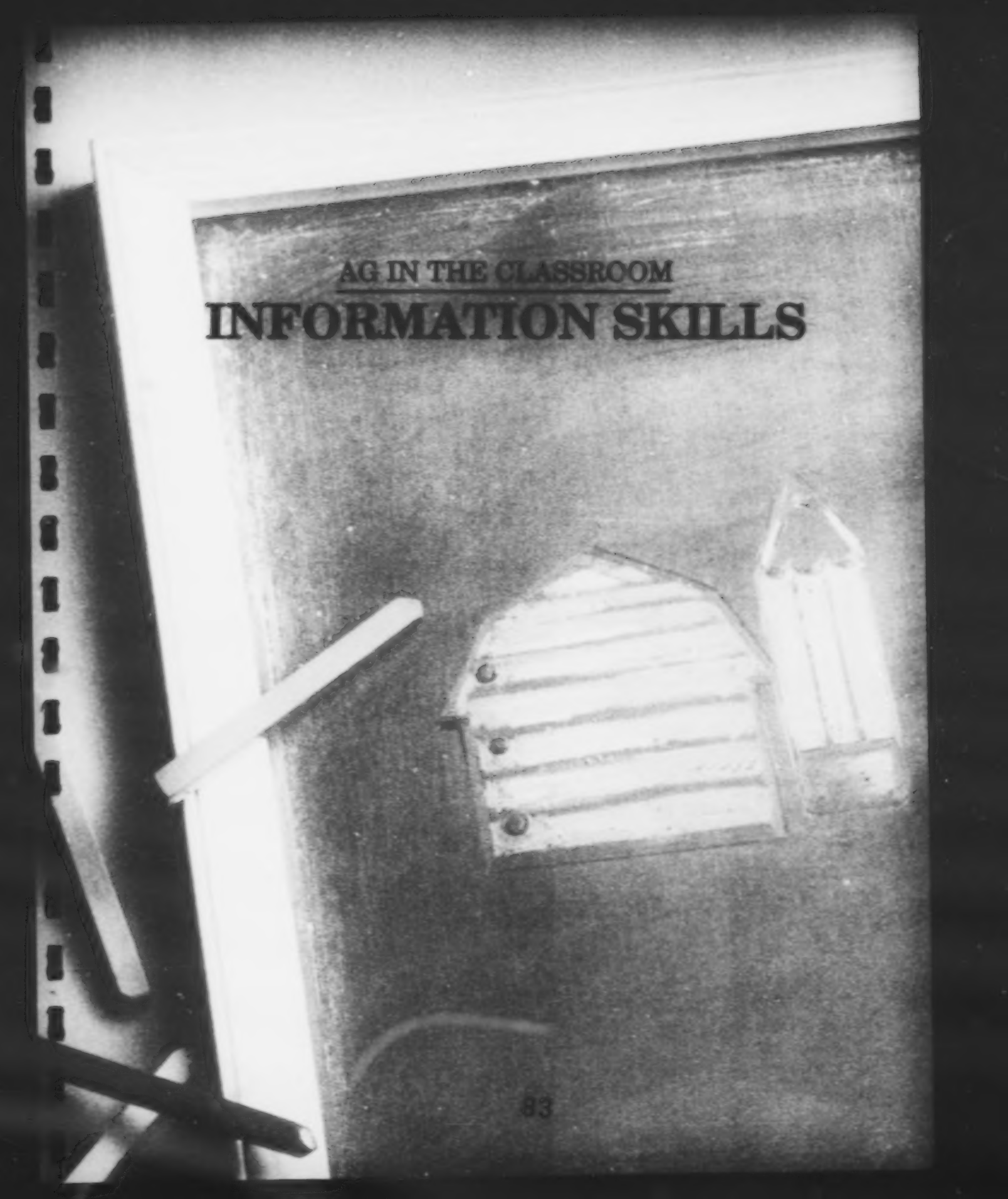
AG IN THE CLASSROOM
INFORMATION SKILLS

LET YOUR FINGERS DO THE WALKING

SUBJECT: Informational Skills **GRADE:** 3-4

AGRICULTURAL TOPIC: Economics **CONCEPT:** VI

STUDENT SKILL
The student will recognize different information sources.

LEARNER OBJECTIVE
The student will use a telephone book as a resource for locating agricultural businesses and people with agriculture-related jobs.

LESSON

A. Step-by-Step Instructions

1. Discuss the purpose of the phone book, and review alphabetizing. Share the background information with the students.
2. Direct the students to complete the questionnaire, using phone books you provide, or send the questionnaires home as a home project.

B. Background

Sam and Janie Thompson are farmers. They like living in the country, but they know farming would be much harder if there weren't a town nearby. When the Thompsons need feed for their animals or seed for planting crops, they call the feed and seed dealer in town. This year they needed to buy a new tractor, so Bob called the farm equipment dealer. When one of their cattle got sick last winter, they called the veterinarian. This spring their wheat developed a strange disease, so the Thompsons called their county Extension agricultural agent to find out what to do.

While Bob drove the combine during harvest, Janie drove the truck to town and sold the harvested wheat at the mill. Since they didn't make as much on their wheat as they had planned, they had to sell some of their cattle at the livestock market.

Their neighbor is a dairy farmer. He depends on milk truck drivers who pick up his milk once a day and take it to the dairy processing plant. Another neighbor grows strawberries and sells them to a farmer's cooperative in town. She sells eggs from her chickens and vegetables from her large garden to one of the local grocery stores.

The Thompsons and their neighbors depend on the people who live in towns, and the people in town need their business. All the businesses in town have people working for them. The people have families that shop in the other stores in town. Those stores make more jobs for more people. Most of these people have children who need teachers. The teachers have families, too, that shop in the stores. All these people together make up a town. And the Thompsons are glad it's there.

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Adams, Barbara Johnson, *The Go Around Dollar*, Macmillan, 1992.

Anderson, Joan, and George Ancona, *The American Family Farm*, Harcourt, Brace, Jovanovich, 1989.
Baylor, Byrd, *Best Town in the World*, Macmillan, 1983.
Imershein, Betsy, *Animal Doctor*, Simon and Schuster, 1988.
Locker, Thomas, *Family Farm*, Dial, 1988.
Spier, Peter, *To Market! To Market!* Doubleday, 1990.

D. Evaluation

Were the students motivated to use this common household reference? Were they able to find all the information requested in the telephone book?

E. Related Activities

1. Make your own classroom telephone book. Have students type the information and create a cover for it.
2. Have students design a yellow page ad for a business. Get ideas from the phone book.
3. Have students look through the yellow pages and find other businesses the farmer might need to call. On a piece of paper, list the names and numbers of the different businesses.

Name _____

Let Your Fingers Do the Walking

☎ *Use a telephone book to find the following information.*

1. Find the location and telephone number of the Oklahoma Cooperative Extension Service in your county.

   _____

2. What is the telephone number of the U. S. Soil Conservation Service office in your county?

   _____

3. On what page would the name "Farmer" appear in the telephone book? Are there any people listed in the telephone book with that last name? How many?

   _____

4. What kinds of listings do you find in the white pages of the telephone book?_____

   _____

   What kinds of listings do you find in the yellow pages? _____

5. Your tractor needs repair. Find the name and telephone number of a machine shop that could help.

   _____

6. Find the name and telephone number of a dealer that can sell you a new pickup truck.

   _____

7. Your chickens are out of food. Write down the name, address and telephone number of a feed supply store.

   _____

8. On what page would your name be listed in the telephone book?_____

☎ ☎ ☎

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BUILD A BUG BARN

SUBJECT: Information Skills **GRADE:** 3-4

AGRICULTURAL TOPIC: Insects **CONCEPT:** IV

STUDENT SKILL
The student will select resources for enjoyment and/or information.

LEARNER OBJECTIVE
The student will research and create habitats for insects.

LESSON

A. Step-by-Step Instructions

1. Share background material. Have students prepare bug habitats ahead of time. Each student should save a milk carton from the school cafeteria, and rinse it out. Have students cut a window on one side of the carton, cover the window with cellophane wrap or waxed paper and tape the translucent covering in place. Provide each student with enough soil to cover the bottom of the milk carton.
2. Have students look at home or in the schoolyard for insects and their close relatives that live in the soil (ants, "roly-polies," beetles). Instruct students to observe the creatures without touching them and take notes on their habits -- what they eat, where they are found, etc. After students have observed the insects, instruct them to capture them carefully and bring them to class alive.
3. Provide reference books so students can identify their insects and learn more about what they need to live.
4. Have students build habitats for their bugs in the milk cartons, using the information they have found. They may use grass, twigs, dead leaves, rocks and anything else the creature might need to survive. Provide students with cotton balls sprinkled with water so the bugs will have something to drink.
5. After the habitats are complete, have students place the bugs inside through the carton opening, then tape the carton shut. Use a fork or large needle to put small air holes in the roof of each habitat.
6. Have students observe the insects for two or three days and report on what they do with the different parts of their habitats. After a few days, take the class outdoors so they can release their insects.

B. Background

There are more different kinds of insects in the world than all other living things put together. Some are so small we need a microscope to see them, and others are several inches in size.

Insects are animals. The animal kingdom is divided into large groups called ***phyla****. All the animals in one phylum have similar characteristics. All the animals that are* ***invertebrates*** *have no backbone. The skeletons of these animals, called* ***exoskeletons****, grow on the outsides of their bodies. The animals we usually call "bugs" are from the* ***arthropod*** *phylum of invertebrate animals with exoskeletons. There are five common classes of arthropods-****insecta*** *(the true insects-grasshoppers, beetles, crickets, butterflies),* ***arachnida*** *(spiders, ticks, scorpions, chiggers),* ***chilopoda*** *(centipedes),* ***crustacea*** *(crawdads, shrimp, crabs), and* ***diplopoda*** *(millipedes).*

Many arthropods are important to the soil. Crayfish, mites, ants, centipedes, millipedes, sow bugs (roly-polies), insects and numerous other species help loosen up the soil by digging through it. They eat dead plants and animals in the soil and excrete them in a form that helps feed living plants. And when they die, their bodies make more organic matter in the soil. Since there are so many of them, and they live such a short time, they contribute hundreds of pounds of organic matter per

acre to the soil every year.

Source: Oklahoma Cooperative Extension Service, Entomology, OSU

C. Resources

Books

Parker, Nancy Winslow, and Joan Richards Wright, *Bugs*, Mulberry, 1987.
Parker, Steve, *Insects, Eyewitness Explorer*, Dorling Kindersley, 1992.
Selsam, Millicent, *Backyard Insects*, Scholastic, 1988.

Additional Resources

Soil Conservation Service, USDA, P.O. Box 2890, Washington, DC 20013.

D. Evaluation

Were students able to provide proper habitats for their bugs and explain to you orally or in written form why they provided the habitats they did?

E. Related Activities

1. Have students write illustrated reports in which they compare and contrast their own habitats with those of the insects they have been watching.
2. Have students classify their bugs and develop simple bug profiles. Are they true insects, crustacea (roly-polies), arachnids (spiders, ticks, mites), diplopoda (millipedes) or chilopoda (centipedes). Are they chewing insects or sucking insects? What do they like to eat? Are they more active in the daylight or the darkness?

LOOK OUT, BELOW!

SUBJECT: Information Skills **GRADE:** 3

AGRICULTURAL TOPIC: Soils **CONCEPT:** IV

STUDENT SKILL
The student will recognize different forms of presentation.

LEARNER OBJECTIVE
The student will learn the four layers of soil and identify the substances that make up each level.

LESSON

A. Step-by-Step Instructions

1. Share background material.
2. As a class, have students build a soil model in an aquarium or large jar. Divide students into groups, and assign each group responsibility for one of the soil levels described in the background information. Have each group research the soil layer for which it is responsible before gathering the necessary materials. Students may gather their own materials or use materials you provide -- shredded dry leaves or grass clippings, a bowl of gravel or small pebbles, sand and potting or garden soil.
4. Photocopy student worksheets on heavy construction paper, and hand them out to your students. Provide students with a variety of media found in the classroom or the home to represent the layers of soil. For example, actual grass clippings and leaves may be used for the organic layer; shavings from the pencil sharpener might represent topsoil; a mixture of cinnamon and sugar or salt and paprika can represent subsoil and rough textured cloth can represent bedrock. Encourage students to come up with their own ideas for representing the different layers.

B. Background

When you dig into the ground under the grass in your yard, you'll find soil. But what happens if you keep on digging? If you dug far enough, would you run out of soil? How far would you have to dig before you ran out? And what would you find there?

If you dug far enough, you would hit solid rock. This is called **bedrock**. *But before you got there you would have to dig through three different layers of soil. The first layer would be nothing but dark-colored* **organic materials**. *That is the layer formed by plants and insects that have died and dead leaves that have fallen. Just under that is the* **topsoil**. *The topsoil is the best place for plants to take root and grow. It is a mixture of air, water, organic material and* **minerals**.

Minerals come from rocks. Minerals have several different ways of getting into the soil. Sometimes they come from the ashes of volcanoes that have erupted. Usually the minerals come from rocks that have broken apart. Water from rain flows into the cracks of rocks. When the water freezes, it expands and causes the cracks in the rocks to get bigger and little bits of the rock to break off. Sometimes the roots of plants will grow into the rocks and cause them to break. Many rocks are broken apart by lichens -- tiny plants that live on rocks. Sometimes water just keeps running over the rock until tiny particles start to wash away. We call all these processes "weathering." Water and wind carry the tiny bits of rock along until they get trapped by the soil. It can take hundreds of years for rocks to break into pieces that are small enough to form soil. It takes between 200 and 500 years for just one inch of topsoil to form.

In most places the topsoil is between six and 20 inches thick. If enough of the topsoil blows or washes away, the farmer is left with **subsoil.** *The subsoil is the layer below the topsoil. It is usually lighter in color and less productive than the topsoil. It is made mostly of clay or sand and has very little organic material. Plants have a hard time growing in subsoil. That's why farmers have to work so hard to conserve their topsoil.*

Between the subsoil and the bedrock you will find a layer of small rocks that have started to break off the bedrock. This layer is called the **parent** *material of the soil. That's because most of what makes up the soil was once part of the rock.*

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Bourgeois, Paulette, *The Amazing Dirt Book,* Addison-Wesley, 1990.

Cole, Joanna, *The Magic Schoolbus Inside the Earth,* Scholastic, 1987.

McLaughlin, Molly, *Earthworms, Dirt and Rotten Leaves,* Avon, 1990.

Stille, Darlene, *Soil Erosion and Pollution,* A New True Book, Children's Press, 1990.

Wyler, Rose, *Science Fun With Mud and Dirt,* Simon and Schuster, 1987.

Additional Resources

Riverside-Corona Resource Conservation District, 2023 Chicago Ave., B-14, Riverside, CA 92507-2305 (eight-page activity packet with hands-on projects to help students understand soil, minimal charge to teachers outside the district).

"Teaching Soil and Water Conservation: A Classroom and Field Guide," Soil Conservation Service, 1345 Main St., Red Bluff, CA 96080 (22 hands-on lessons that teach the concepts of soil erosion and the importance of conservation, free).

"The Story of Land: Its Uses and Misuses Through the Centuries," Soil Conservation Society of America, 7515 NE Ankeny Rd., Ankeny, IA 50021-9764 (25 cents each, 15 cents for teacher's guide).

D. Evaluation

Students should layer materials in the following order, beginning at the bottom: gravel or small stones; sand; garden or potting soil; grass or leaves.

E. Related Activities

1. Have students grow a bean or some other hardy plant in each of the three soil levels. Use clean, cardboard milk cartons from the cafeteria, and fill one with garden or potting soil, one with sand or clay and one with gravel or stones. Provide each plant with the same amount of water and light. Have students use the "Predict and Observe" chart at the back of the book to record their observations.
2. Divide students into groups and have each group pour a small amount of garden or potting soil onto paper. Instruct students to spread the soil out and let it dry. Provide each group with a hand lens, and have them separate the particles they find by size and color. Have students write paragraphs about the activity in which they report what they learned about topsoil.
3. Fill two jars half full with water. Label one jar "water" and the second jar "carbon dioxide." Take a straw and blow air into the jar labeled "carbon dioxide." Your breath will provide the carbon dioxide. Fill a third jar half full with vinegar and label it "vinegar." Put a limestone rock in each jar and put one limestone rock aside for a reference. Wait one day, and have students look at the jars and discuss what they see.
4. Create Dirt Cake, using the recipe on the following page.

Dirt Cake

1 package cream-filled chocolate cookies
1 package (eight ounces) cream cheese, softened
4 tablespoons butter or margarine, softened
1 cup confectioners' sugar
2 packages (3.4 ounces each) instant vanilla pudding mix
3 1/2 cups cold milk
1 carton (12 ounces) frozen whipped topping, thawed
1 new flowerpot (8x10 inches)
silk flowers
candy gummy worms

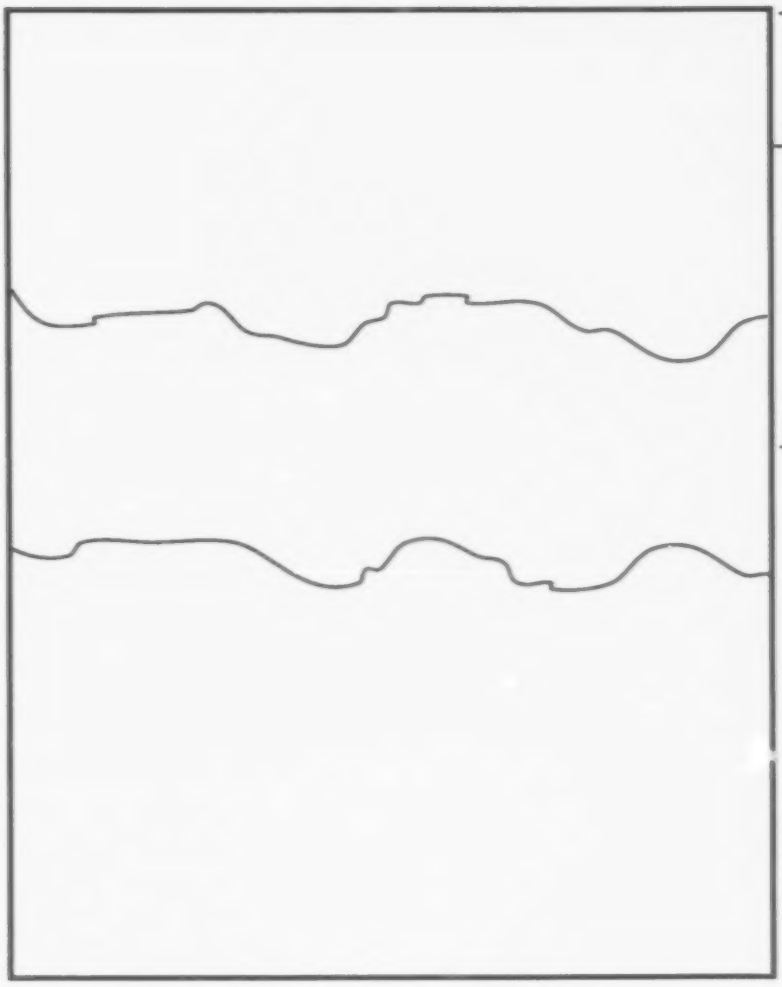
In a food processor or blender, crush cookies until fine. Set aside. In a mixing bowl, beat cream cheese, butter and sugar until smooth. In another bowl, mix pudding and milk until well blended. Fold into cream cheese mixture. Fold in whipped topping. Line flower pot with foil. Alternate layers of crumbs and pudding, ending with crumbs. Chill several hours or overnight. Decorate with silk flowers and gummy worms. Yield: 12 servings.

This recipe can be adapted to smaller pots for individual servings.

Name _____

Look Out, Below!

Label the four layers of soil, and then create them, using different types of materials.



1. _____
2. _____
3. _____
4. _____

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

WHAT'S IN THE GARDEN?

SUBJECT: Information Skills **GRADE:** 3

AGRICULTURAL TOPIC: Horticulture **CONCEPT:** I

STUDENT SKILL

The student will recognize different information sources.

LEARNER OBJECTIVE

The student will plant unidentified seeds and identify the seedlings after they have sprouted.

LESSON

A. Step-by-Step Instructions

1. Have each student bring one egg carton to class and write his or her name on the carton lid. Provide students with enough sand or peat moss to fill the cartons.
2. Bring several packets of common vegetable and flower seeds to class. Make sure you buy seeds that have pictures of the sprouted seeds on the backs of the packets and that students will be familiar with the flowers and vegetables you choose. Dump all the seeds into one bowl and mix them together. Save the seed packets.
4. Give each student a handful of mixed seeds. Have students look at the seeds and see if they can identify them. Then have students plant a different kind of seed in each compartment of their egg cartons. Provide spray bottles so students can moisten the sand or peat moss, then instruct students to close the cartons and set them in a place where they won't be disturbed for a few days.
5. Hang the seed packets on the bulletin board, and have students copy the line drawings of the sprouts. Then provide gardening books or seed catalogues, and have students draw pictures of what the plants will look like when they grow to maturity.
6. Have students check their egg cartons every day to make sure the planting medium remains moist. When the seeds begin to sprout, seedlings should be uncovered and set in the window.
7. Have students identify their seedlings. Then have each student look up information on growing the plants they have sprouted and tell the class what kind of care the plants need.

B. Background

A seed is a protective case surrounding a new plant. The seed coat is just that, a coat. It protects the ***embryo****, or baby plant, from rough treatment, cold and heat. When it is soaked in water, the seed coat will soften and let go, allowing the embryo to push through and grow, or* ***germinate****. All plants first come up as seedlings. The plant uses the food from the seed until it begins to grow roots, which absorb food from the soil.*

There are many different kinds of seeds. Some seeds are ready to germinate right after they are produced. Others need a period of ***dormancy*** *and cold before they will grow. Some seeds grow quickly. Others grow very slowly. Some seeds, including seeds from many kinds of trees, must never be allowed to dry out before planting. Some seeds, like walnut, olive, peach and plum, have very hard coats which must be cracked before they can take in water and begin to grow.*

Some seeds will not germinate unless they get lots of water. Beans, peas, beets and lettuce need a lot of water. Cabbage, turnip, sweet corn, cucumber,

onion, carrot and tomatoes do not.

Some seeds stay viable longer than others. A seed is viable as long as it will still grow into a plant. Onion and corn seed are usually viable for only a year. Pea, bean, cabbage and cauliflower seeds will last for three years. Melon seeds will last as long as seven years.

Seedlings will die if they are allowed to dry out. Soil that is too rich can kill them, too. But they need to have a good supply of plant food nearby in the soil. One type of plant food, phosphorous, is especially important to help the young seedling grow a strong root system.

Plant seeds in soil that will hold moisture but will also drain well. If seedlings are planted too deeply or get too much water they may not get all the oxygen they need.

The first thing to emerge from the seed is the radicle, which becomes the root. Next come the cotyledons. The cotyledons are the part of the seed that supply energy for the baby plant until it begins to make its own food. True leaves begin to appear after the cotyledons emerge. Transplant seedlings after the first pair of true leaves form. By this time seedlings will have developed roots that are as long as the plant is tall.

Source: Oklahoma Cooperative Extension Service, Horticulture and Landscape Architecture, OSU

C. Resources

Books

Bjork, Christina, and Lena Anderson, *Linnea's Windowsill Garden,* Farrar, Straus and Giroux, 1988.

Brown, Marc, *Your First Garden Book,* Little, Brown, 1981.

Delton, Judy, *Pee Wee Scouts #9, Spring Sprouts,* Dell Young Yearling, 1989.

Jennings, Terry, *Seeds: Junior Science,* Watts, 1988.

Kuhn, Dwight, *More Than Just a Flower Garden,* Silver-Burdett, 1990.

Kuhn, Dwight, *More Than Just a Vegetable Garden,* Silver-Burdett, 1990.

Rylant, Cynthia, *This Year's Garden,* Macmillan, 1984.

Webster, Vera R., *Plant Experiments,* Children's Press, 1982.

Wexler, Jerome, *Flowers, Fruits, Seeds,* Simon and Schuster, 1991.

Additional Resources

"A Child's Garden Seed Collection," Watch It Grow, 2560 Nickel Place, Hayward, CA 94545 (vegetable and flower seeds especially for a child's garden, $1).

D. Evaluation

Were students able to identify their seedlings?

E. Related Activities

Have students save milk cartons from the cafeteria and transplant their seedlings, using the information they found in the gardening books. Instruct students to choose only two or three of the strongest seedlings. Students may take their plants home for planting outdoors.

THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT

SUBJECT: Information Skills GRADE: 4

AGRICULTURAL TOPIC: Goats CONCEPT: III

STUDENT SKILL
The student will recognize significant components of various information sources.

LEARNER OBJECTIVE
The student will practice telling time while reading about a goat with an unusual trait.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets.
2. Read the story aloud, or have students read the story to themselves. Instruct students to place hands on clock faces and write numbers on the digital clocks to show the appropriate times.
3. Share background infomation.

B. Background

Goats are an important part of the story of mankind. Along with sheep, they were probably some of the first animals to be domesticated. Although most people in our country depend on cows for milk, people in many other parts of the world depend on goats. The goat is sometimes called "the poor man's cow," because goats can live on **forage** *that will not support cattle or sheep.*

Goats were very important to early European settlers struggling to survive in the New World. Even when conditions were harsh and the goats had little food to eat, they continued to supply settlers with dairy products.

Goat's milk is easier to digest than cow's milk, so it is often given to infants who cannot tolerate cow's milk. Goat's milk is also higher in calcium, potassium, phosphorous and Vitamins A and C than cow's milk. In addition to milk, dairy goats provide meat and skins for making leather. Angora and cashmere goats provide mohair and cashmere hair for clothing.

Goats make good pets because they are gentle, friendly and intelligent. They also cost very little to feed and need very little space. A female goat is called a **doe**, *or a* **nanny**, *and a male goat is called a* **buck**, *or a* **billy**.

Fainting goats look and act like any other goat, except that when they are startled, their muscles become rigid, causing them to fall over. After about 15 seconds the animal will get up and move around as before, although its legs will be stiff for a short time. The exact origin of fainting goats is not known. The earliest records trace them to Marshall County, Tennessee, in the early 1800s.

Fainting goats can't jump fences, so they're easy to keep. That can be a problem, sometimes, though, because they are easy prey for dogs and coyotes. Their condition causes them not to have the "get away" instinct that other animals have when they are in danger. Instead, there muscles become rigid, and they fall over or can't move.

Farmers who raise fainting goats usually do so because they are unusual and

make for great stories. In one story, a Tennessee Valley Authority official was driving past a herd of goats when his truck backfired. The entire herd collapsed, and the official thought he had scared them to death. He drove to the farmer's house, apologized and paid him for the goats. The next day he drove past the same farm and saw the same herd of goats -- completely recovered.

Another story tells of the time the army was holding mock battles in Tennessee. One day a line of tanks came over a hill and caused a herd of goats to topple over. A young officer immediately went to the farmer and wrote a credit from the army for the loss. According to the story, the farmer let the army buy that same herd of goats several times before the training was over.

Source: Langston University E. (Kika) de la Garza Goat Research Institute

C. Resources

Books

Andersen, Hans Christian, *The Ugly Duckling, A Classic Tale*, Childsworld, 1988.
Blood, Charles, *Goat in the Rug*, Macmillan, 1976.
Spier, Peter, *To Market! To Market!* Doubleday, 1990.

Additional Resources

International Fainting Goat Association, Ruth Prentice, Registrar, Rt. 1, Box 112, Terril, IA 51364.
Oklahoma Dairy Goat Association, c/o Forester's Dairy Goats, Rt. 2, Box 290, Bixby, OK 74008.

D. Evaluation

Were students able to record the correct times on the clocks?

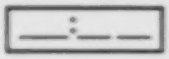
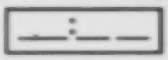
E. Related Activities

1. Have students write their own fainting goat stories.
2. Have students write letters to the International Fainting Goat Association, asking for more information about fainting goats. Collect the letters and place them all in one envelope for mailing.
3. Have students research what other kinds of milk people drink in other parts of the world. Students may use a world map to chart the different milk-producing animals.
4. Discuss the definition of a fable, and ask students if the story of Franny is really a fable. If not, why not, and if so, what is the moral of the story?

Name _____

The Fable of Franny and Her Fabulous Fainting Goat

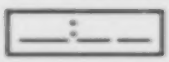
Read the story. Place the hands of the clocks in the correct positions on the clock faces, and write in the correct numbers on the digital clocks.

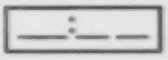
The sun was just coming up as Franny Fields and her father, Frank, left the farm.  Franny looked at her watch. "Sunrise at **6:00**," she told her father. "We're leaving in plenty of time," Frank Fields told his daughter. "The farmer's auction doesn't start until **8:30**, and Freedom is only 90 miles away." 

Franny loved the drive into Freedom in the early morning. As they drove along Franny watched the sun shining off the hillsides that lined the river.

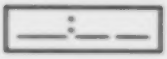
"Do you think anyone will have any goats to sell?" Franny asked her father. Do you think we can get one?"

"We'll just have to wait and see how much they cost," her father smiled.

The clock on the Freedom Bank said **7:45** as the Fields drove into Freedom. "We've got plenty of time. Let's stop for breakfast," Frank Fields said. 

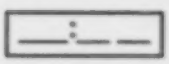
Service was a little slow at the cafe, and it was **8:45** by the time the Fields got to the auction. While Mr. Fields stood in line to get a buyer number from the clerk, Franny watched a farmer unload two small black and white spotted kids, or baby goats. "Dad, look!" Franny tugged on her father's arm and pointed in the direction of the goats. 

"Those are good looking goats. Someone has taken good care of them. They may be too expensive for us, Franny. Don't get your hopes up too high," Frank Fields said as he patted his daughter on the head.

 By **11:00**, when the auctioneer's helper finally led the pair of goats onto the auction block, Franny's stomach had started to churn with excitement. The bidding started at $10 for the pair. For a few moments no one placed a bid; then Frank Fields raised his hand slightly. Quickly a woman across the way raised the bid. Within a few minutes the bid had gone to $35, and Franny knew her father would go no higher.

"Going once, twice, sold to buyer number 18," the auctioneer cried. Franny's heart sank. Her father's number was 23.

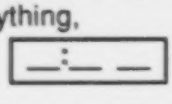
It was nearly **noon** when Franny and her father walked out of the auction into the bright sun.

 A disappointed Franny was ready to go home. As the Fields headed for their pickup, a lady approached them. Franny recognized her as the woman who had bought the pair of goats.

"I only wanted the billy goat," the woman told Frank Fields after introducing herself. "Would you like to buy the nanny for $15?"

"Yes," said Franny, before her father had time to reply. "Yes," her father laughed. "What shall we call her," Frank Fields asked his daughter as they rode home along the river. "I think I'll just call her 'Nanny," Franny said.

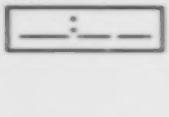
Over the next few days Nanny became a real pet. It would follow Franny all over the backyard and even tried to come inside a time or two. Franny discovered her little kid would eat almost anything, including Mother's flowers.



Franny's mother came home from work one evening at **5:30** and found Nanny eating her marigolds. She jumped from the car and ran across the yard, clapping her hands and shouting at Nanny. About half way across the yard she stopped in dismay. Nanny had fallen over in the half-eaten flowers. She looked like she was dead.

"What ever could be wrong?" Mrs. Fields thought. By the time she reached Nanny, the goat had begun to move. It jumped to its feet and walked away.

Mrs. Fields was still angry about the flowers when she told the story to Franny and her father. Franny thought the story was strange and even a little funny, but she held back her giggles and went to check on Nanny. The little goat seemed fine.



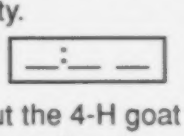
At **7:00** the next morning Franny ran out the back door to feed Nanny. As the screen door slammed Nanny once again fell to the ground. Franny ran back inside to get her father.

"I guess we'd better call the veterinarian," Frank Fields told his daughter after looking at the little goat. We'll have to wait until **8:00**, when Dr. Wright gets to her office.

Franny was on pins and needles for the next hour waiting for the veterinarian's office to open. " I'm glad I only paid $15 for that goat," Frank Fields told his wife. "There's obviously something wrong with her."

Dr. Wright looked Nanny over but could find nothing wrong. "I've heard of fainting goats, but I've never seen one, and I don't know very much about them," Dr. Wright told the Fields. She assured Franny her goat was fine. She suggested that Mr. Fields contact the E. (Kika) de la Garza Institute for Goat Research at Langston University.

For the next three days Franny waited anxiously for the **9:45** mail delivery. When the envelope arrived, she ran to the house to read more about her pet. The envelope contained information about the 4-H goat project, information about fainting goats, and the address for the International Fainting Goat Association.



Franny learned that Nanny was a very special kind of goat that simply faints whenever it is frightened by a loud noise. Franny also learned that her $15 goat could be worth as much as $400.

The news of Franny's fainting nanny spread quickly. Before long total strangers were stopping by to see the goat. One farmer in town offered to buy her for much more than Franny's father had paid. Franny was in no hurry to part with her pet, though. And Franny's father liked having the pet around. Nanny reminded him that things are not always as they seem. Franny's mother still got angry and shouted at Nanny whenever she got into the marigolds. But her anger turned to laughter every time she watched the little goat fall over in the flower bed.

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994

LABEL LANGUAGE

SUBJECT: Information Skills **GRADE:** 4

AGRICULTURAL TOPIC: Nutrition **CONCEPT:** V

STUDENT SKILL

The student will recognize significant components of various information sources.

LEARNER OBJECTIVE

Students will become familiar with the purpose of labeling food and will practice reading and using label information.

LESSON

A. Step-by-Step Instructions

1. Bring in an assortment of print advertisements or taped commercials. Discuss the many reasons students would or would not be interested in the products they see advertised. Discuss the eye-catching colors, special offers, the models or actors used, etc. Ask students if they are swayed to buy the product more by packaging or by what their families or peers like.
2. Share the background information with students.
3. Bring a variety of products into the classroom, and hand out student survey worksheets for students to complete, using labels from the products.

B. Background

Food labels tell us exactly what is in the food we are eating. Some people need to know this because they have health problems and have to avoid some foods. Some people can't eat certain foods for religious reasons. Most people who read labels just want to know what's in their food so they can avoid foods that are bad for them and get plenty of the foods that are good for them.

Until recently, most food manufacturers were required to do no more than provide a list of all the ingredients that went into their products. Some didn't even have to do that. The makers of ***standard foods*** *like macaroni, ketchup and jelly weren't required to list all their ingredients as long as they followed a certain recipe. Jelly makers didn't have to say what all went into their jelly, as long as they made sure they used at least 45 percent fruit. If they used any less, they couldn't call it jelly. Most people knew that jelly was about half fruit and half sugar, because not too long ago many people made their own jelly.*

Even though the recipes for standard foods haven't changed much, people these days aren't so familiar with what goes into them, so they want the ingredients listed on the package. A new law passed in 1993 says even manufacturers of standard foods have to list all their ingredients.

The first ingredient on the list will be the main ingredient. On a jar of jelly, the first ingredient listed may be ***fructose*** *or* ***sucrose****. Those are two kinds of sugar. If they are first on the list you know there is more sugar in the jelly than anything else. The next ingredient on the list will probably be some kind of fruit. That means after sugar there is more fruit than anything else.*

Another new law says food manufacturers have to show how much of the U.S. Food and Drug Administration's ***recommended daily allowances*** *(RDA) are in one serving of the food. Recommended daily allowances are what nutrition experts say we need to eat every day to be healthy.*

Source: Oklahoma Cooperative Extension Service, Nutritional Sciences, OSU

C. Resources

Books

Ross, Catherine, and Susan Wallace, *The Amazing Milk Book,* Addison-Wesley, 1991.

Turner, Dorothy, *Potatoes,* Carolrhoda, 1989.

Walter, Mildred Pitts, *Justin and the Best Biscuits in the World,* Knopf, 1986.

Wyler, Rose, *Science Fun with Peanuts and Popcorn,* Simon and Schuster, 1986.

Additional Resources

"Good as Gold," National Museum of Natural History, Publications Division, Smithsonian Institution, Washington, DC 20560 (poster featuring 80 foods of American origin, $6).

"The Great Green Bean," Yarnhill County Women for Agriculture, P.O. Box 101, Dayton, OR 97114 (videotape, $12).

"It's Turkey Time," Yarnhill County Women for Agriculture, P.O. Box 101, Dayton, OR 97114 (videotape, $12).

The Popcorn Institute, 111 E. Wacker Dr. Suite 600, Chicago, IL 60601 (free popcorn teaching guide for grade 1-3 and 4-6, includes nutritional information and history of popcorn. Send 25 cents with a large self-addressed stamped envelope.)

D. Evaluation

Were the students able to use the products provided to answer the questions on the product survey sheets? Did they understand that the label is there to provide information to the consumer?

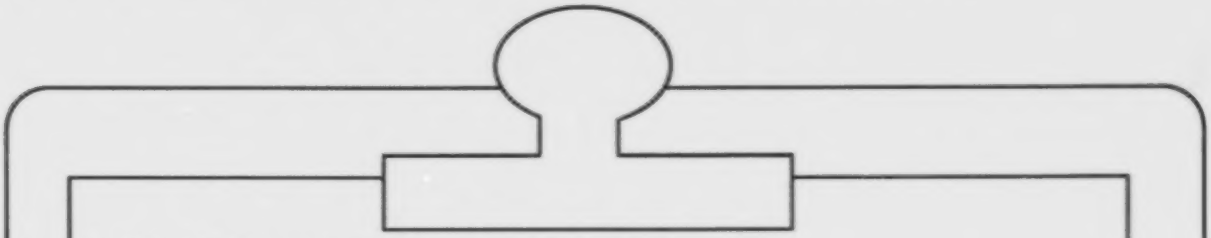
E. Related Activities

1. Discuss the pros and cons of having a law that requires fast food restaurants to list and label all of their products.
2. Have students list names or bring in the packaging from products that originate in Oklahoma.
3. Bring a blender or food processor to class, and help students make peanut butter. Pour about one cup of unsalted, roasted peanuts into the blender, cover it and set it for grind. Scrape the peanut butter from around the blades periodically. Add one tablespoon vegetable oil to help the peanuts blend more quickly. When the peanut butter is the desired consistency, use a spatula to scrape it from the sides and bottom of the blender. Bring two or three jars of commercial peanut butter to class. One jar should be natural peanut butter (no sugar, salt or preservatives added) and the other should be a familiar brand. Let students taste all the commercial and class-made peanut butter to see which they like best. Then have students read the labels of the commercial peanut butter and compare the ingredients with those used in the class-made peanut butter.

Name _____

Label Language

Fill out the survey form, using the information from the package of your choice.



1. What is the name of your product? _____
2. Where is it made? _____
3. What is the name of the company that makes this product? _____

_____

4. How many servings are in a container? _____
5. How much did the product cost? _____
6. Would you buy this product? (circle one) Yes No

Why, or why not? _____

_____

7. Is the packaging of the product appealing to you? (circle one) Yes No

Why, or why not? _____

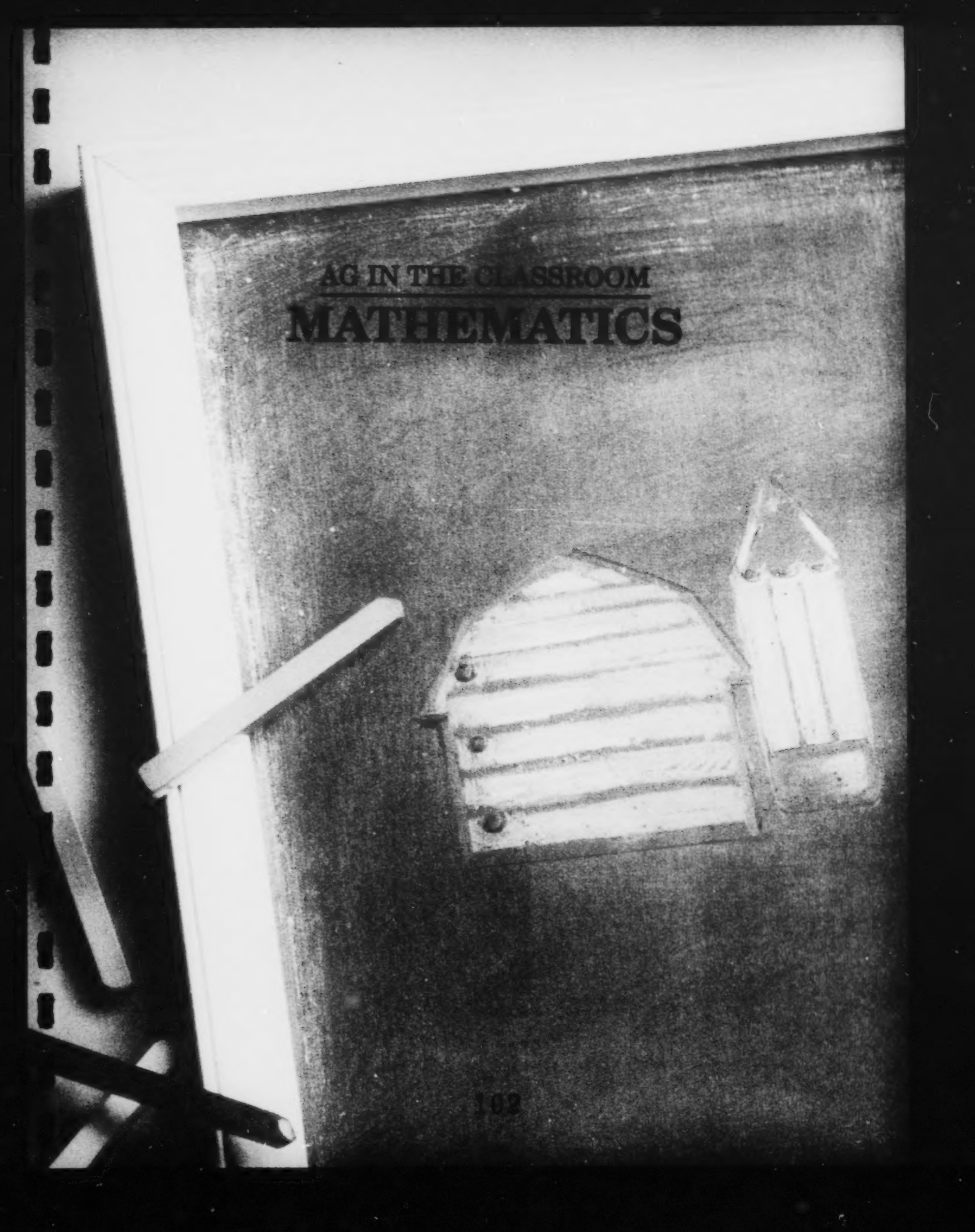
_____

8. Divide the serving sizes by the total price of the product. How much does one serving cost? _____
9. Are there any vitamins or minerals listed on the package as providing 100% of the USDA daily requirements? What are they? _____

_____

10 Are there any vitamins or minerals listed on the product as contributing 0%? What are they? _____

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994


AG IN THE CLASSROOM
MATHEMATICS
102

BARNYARD MATH

SUBJECT: Mathematics **GRADE:** 3-4

AGRICULTURAL TOPIC: Farm Site **CONCEPT:** I

STUDENT SKILL

The student will develop and apply strategies to solve a variety of routine and nonroutine problems.

LEARNER OBJECTIVE

The student will review and practice multiplication and division operations, using pictures of barnyard animals and agriculture-related activities.

LESSON

A. Step-by-Step Instructions

1. Lead students in reviewing multiplication and division.
2. Share background material.
3. Hand out student worksheets, and review directions from each worksheet together, as a class.

B. Background

Oklahoma barns and barnyards come in many different shapes and sizes. The big wooden barns you usually see in pictures of farms don't fit the way most Oklahoma farmers run their farming operations these days. In the old wooden barns the farmer would store hay in a loft overhead and keep the animals down below. Hay bales were shaped like cubes or piled in loose hay stacks. Modern hay baling machinery gathers hay into large cylinders that don't fit in a loft. These bales are stored outdoors where they are easy for farmers to move from one place to another. Since wooden barns deteriorate quickly, many farmers find it is less expensive to buy prefabricated metal buildings for storing machinery and feed or for providing shelter for their animals.

Today most farm animals stay outdoors, unless they are sick and need medical attention or are giving birth. Farmers who have cow and calf operations usually have barns to provide shelters for newborn calves and their mothers. Sheep farmers keep newborn lambs and their mothers sheltered for several days, until the lambs are ready to stay outdoors. Dairy farmers keep their animals close so they can bring them into the milking parlor at least twice a day. Hogs stay in pens that are partially open to help circulate air around them.

In the past several years farmers have decided it is healthier to keep their animals outdoors as much as possible. When animals stay outdoors, they are not as likely to spread diseases from one to the other. Animals that stay outdoors get accustomed to changes in the weather and are stronger.

When animals are kept in a barnyard day after day, manure starts to build up, and the farmer has to clean it out. If animals stay in the fields and are herded from field to field, manure doesn't build up as much. Instead it deteriorates naturally and helps fertilize the fields.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Archambault, John, and Bill Martin, Jr., *Barn Dance,* Holt, 1986.
Gammell, Stephen, *Once Upon MacDonald's Farm,* Macmillan, 1984.

Gibbons, Gail, *The Milk Makers,* Macmillan, 1985.
Johnson, Evelyne, *The Cow in the Kitchen,* Bell, 1983.
King, P.E., *Down on the Funny Farm,* Random House, 1986.
Lindbergh, Reeve, and Susan Jeffers, *Benjamin's Barn,* Dial, 1990.
Noble, Trinka Hakes, *Meanwhile Back at the Farm,* Dial, 1987.

Additional Resources

"Farm Animals," National Geographic Educational Services, 17th and M Street, N.W. Washington, DC 20036 (multimedia kit, including 30 copies of eight-page booklet, read-a-long tape and duplicating masters, $35).

D. Evaluation

Were students able to solve the problems printed on the worksheets?

E. Related Activities

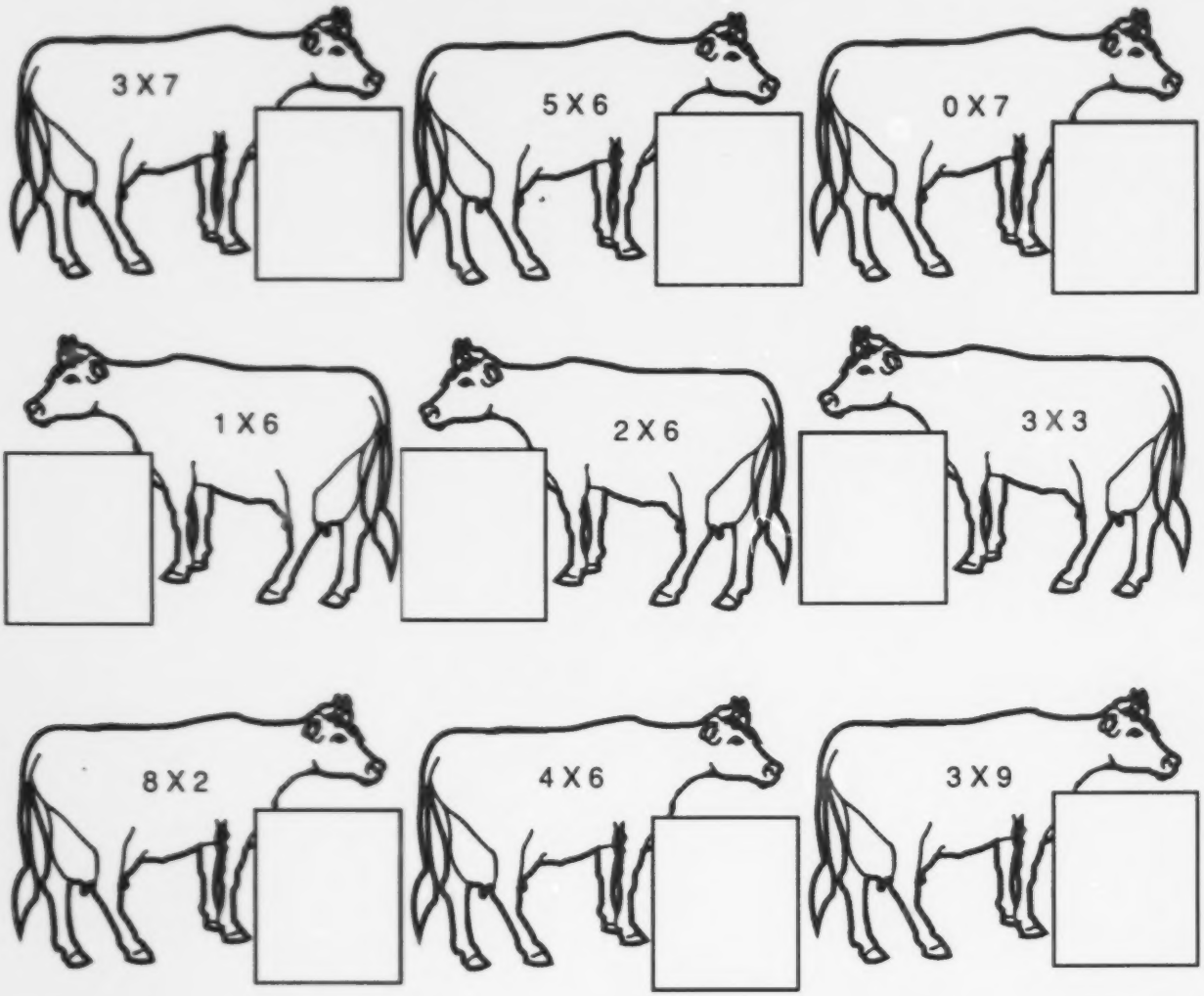
1. Have a local veterinarian come and visit with the students about the types of animals found on a farm and their special needs.
2. Have students design their own barns and barnyards, keeping in mind the special needs of the animals they want to keep. Students may draw their designs or use cardboard and other materials to make models.

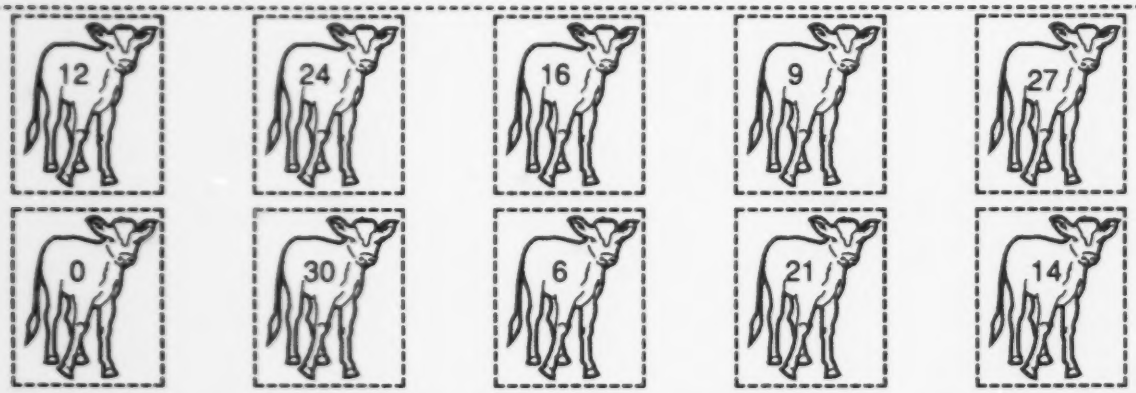
Name _____

Barnyard Math

A

Cut and glue each calf to the matching cow. There will be one lost calf with no mother.





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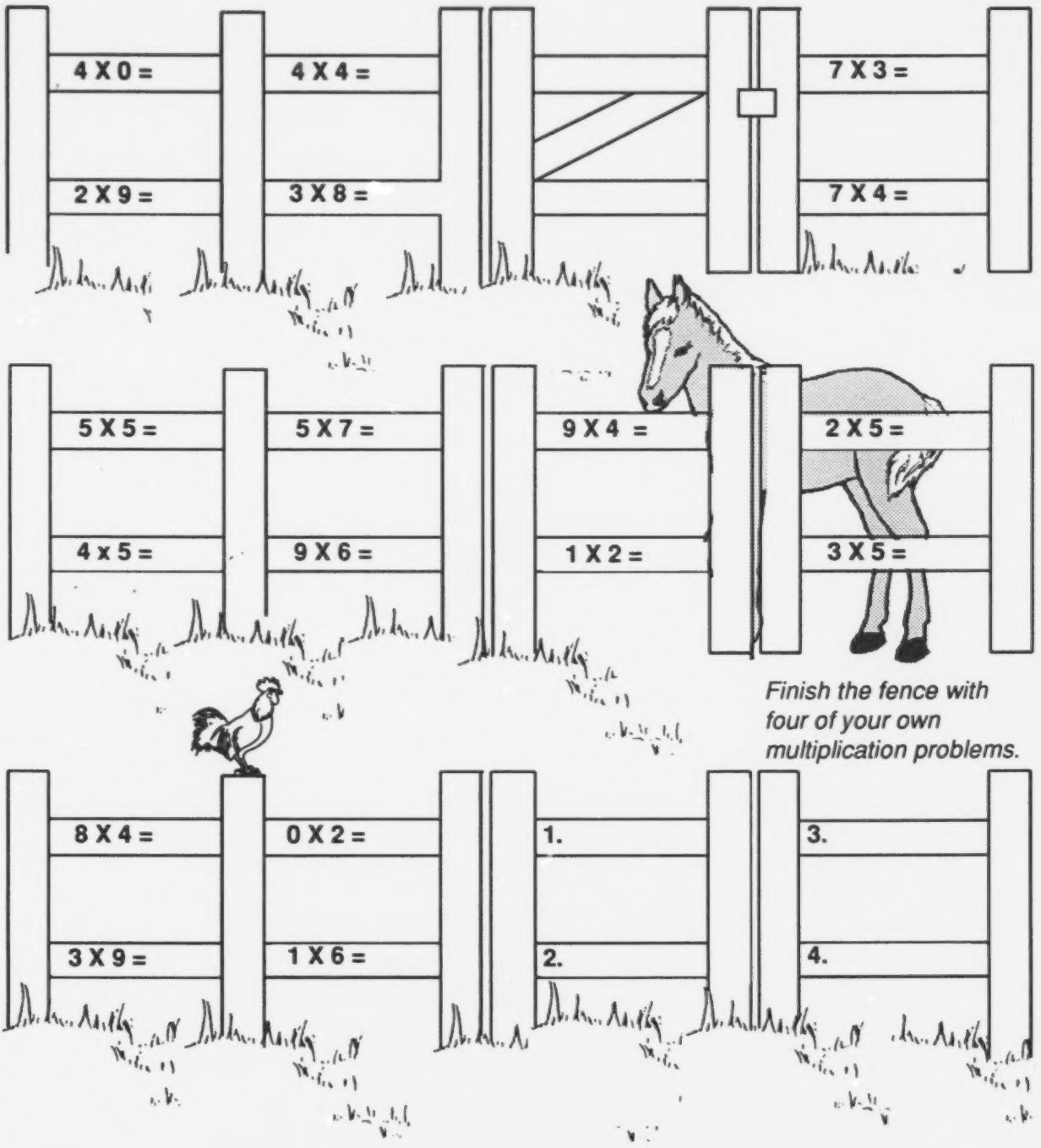
Name _____

Barnyard Math B

Build a fence by completing the math problems.



Finish the fence with four of your own multiplication problems.

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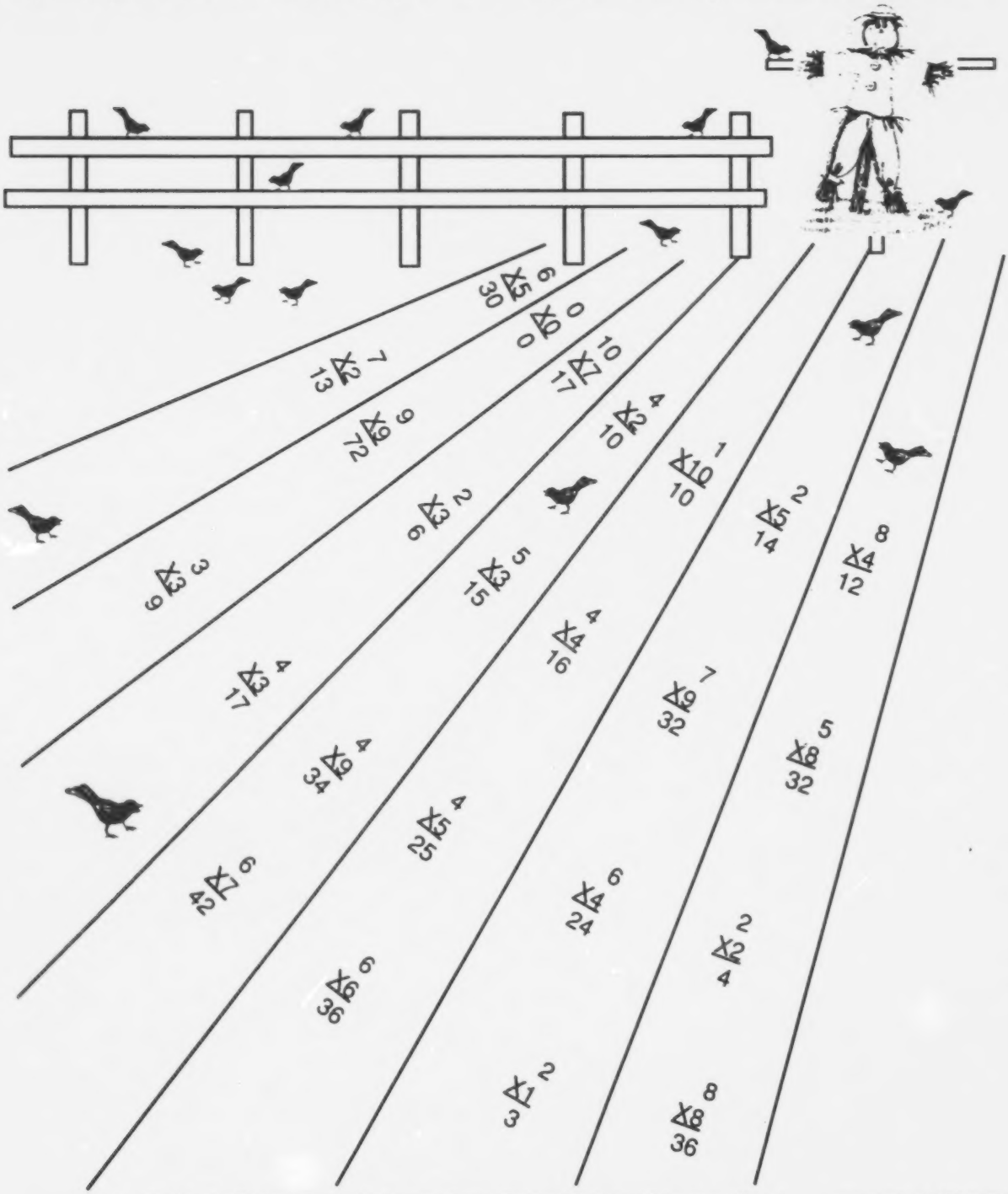
Name _____

Barnyard Math C

Help the scarecrow watch over the field. Look at each multiplication problem. Color over the incorrect problems with a brown crayon. Leave the correct math problems in the field.



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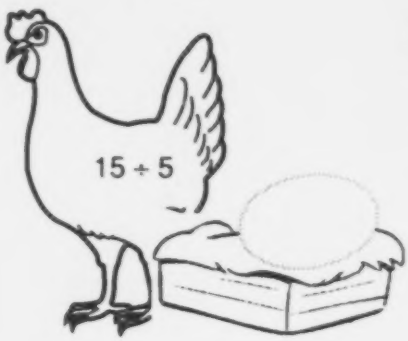
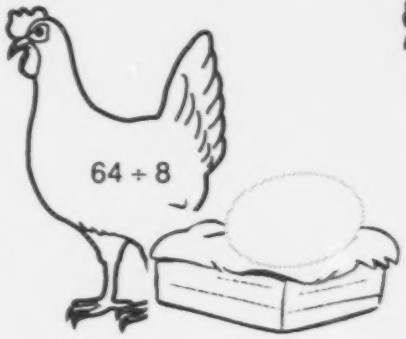
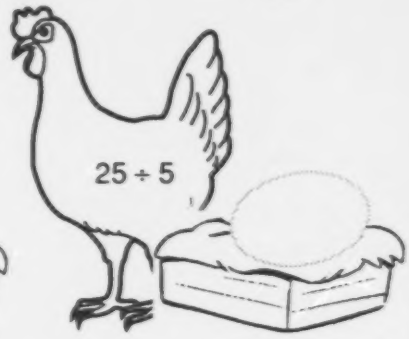
Name _____

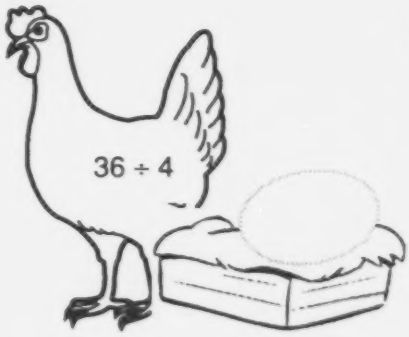
Barnyard Math D

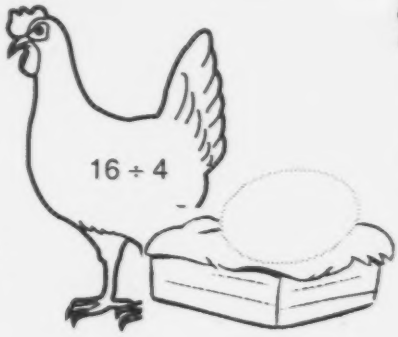
Cut, match and glue each egg to the hen with the correct division problem. Choose one problem you do not want to complete, and put a crack on that egg answer space.

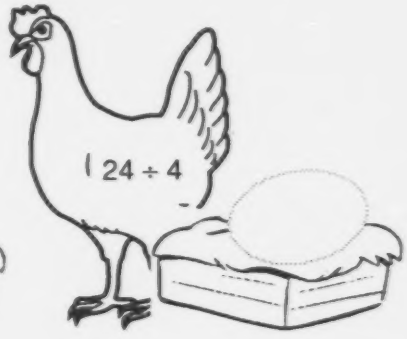


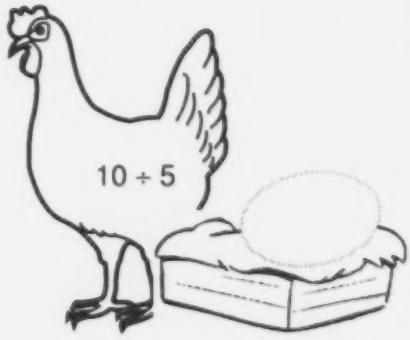


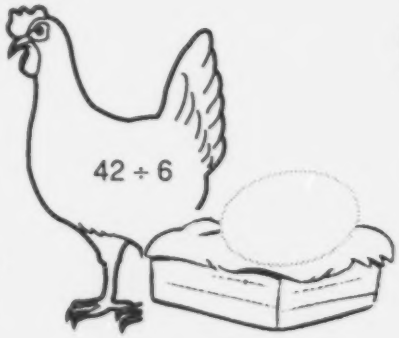


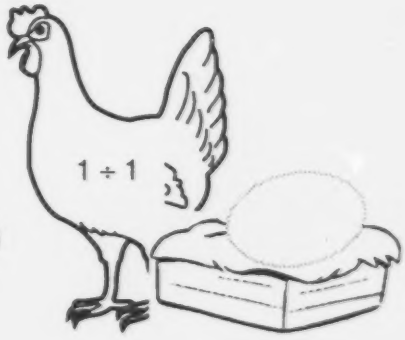












7 8 4 3 6 2 5 9 1

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CHECK YOUR FARM ACCOUNT

SUBJECT: Mathematics **GRADE:** 3-4

AGRICULTURAL TOPIC: Economics **CONCEPT:** II

STUDENT SKILL
The student will use mathematics in daily life.

LEARNER OBJECTIVE
The student will read a paragraph and then complete a check blank, using the information provided in the reading.

LESSON

A. Step-by-Step Instructions
1. Review with students the way to write numerals in word form, and discuss the purpose of having a checking account.
2. Hand out the student worksheets, and read through the directions and the information paragraphs with your class.
3. Have students complete the check blanks, using the information provided.

B. Background

The farmer must maintain a good relationship with his or her banker. Since farming is a business, a farmer must be a good manager and a good bookkeeper. When the farmer goes to the bank for a loan, he or she must show the banker that his or her business will make a profit. The banker needs to be sure the farmer can pay back the borrowed money as quickly as the bank wants it paid back.

Bankers in farming or ranching communities must have some knowledge of farming or ranching so they can understand what it takes to make a farming or ranching operation work. The banker must understand the special problems weather can create and how the prices for agricultural commodities can change from one year to the next. Farmers and ranchers depend on the banker to understand agricultural matters so they can come to him or her for financial advice.

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Brittain, Bill, *All the Money in the World*, Harper Collins, 1979.
Hall, Donald, *The Ox Cart Man*, Viking, 1979.
Spier, Peter, *To Market! To Market!* Doubleday, 1990.
Ziefert, Harriet, *A New Coat For Anna*, Knopf, 1986.

D. Evaluation
Were students able to complete the checks correctly with the information provided?

E. Related Activities
1. Invite a banker in to tell about his or her duties and responsibilities.
2. Take a trip to a bank nearby, and learn about its day to day functions.

Name _____

Check Your Farm Account A

Read each paragraph. Use the information to fill in the checks. Be sure to sign your name in cursive handwriting.

1. On February 2 you go to the barn to feed the cows and discover there is no food. You call Smith Feed Store to order 50 bags of cattle cubes for a total cost of $127.50. Write a check to pay for the feed.

check #0001

_____ Farm Account
your name

_____, 19_____

PAY TO THE ORDER OF _____ $ _____

_____ DOLLARS

Ag Bank

_____
signature

memo_____

2. You have been invited to ride in the November 14 rodeo parade. You want to look your best, so you need a new outfit. Western World has jeans on sale for $16.95 and a cowboy shirt you like for $25.50. The tax is $2.97. Write a check to pay for your new duds.

check #0002

_____ Farm Account
your name

_____, 19_____

PAY TO THE ORDER OF _____ $ _____

_____ DOLLARS

Ag Bank

_____
signature

memo_____

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Name _____

Check Your Farm Account B

Read each paragraph. Use the information to fill in the checks. Be sure to sign your name in cursive handwriting.

3. It is time to pay your yearly dues to the National Peanut Commission. The dues must be in the national office by January 15. It costs $25 a year to be a member. Complete the check below to pay your dues.

check #0003

_____ Farm Account
your name

_____, 19_____

PAY TO THE ORDER OF _____ $ _____

_____ DOLLARS

Ag Bank

_____
signature

memo_____

4. Checks come in many colors. Some even have light pictures in the background. Pictures might be of kittens, flowers, ocean scenes or clowns. Design a check picture that would express your likes or personality.

check #0004

_____ Farm Account
your name

_____, 19_____

PAY TO THE ORDER OF _____ $ _____

_____ DOLLARS

Ag Bank

_____
signature

memo_____

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THE PAPER CHASE

SUBJECT: Mathematics **GRADE:** 3-4

AGRICULTURAL TOPIC: Forestry **CONCEPT:** V

STUDENT SKILL

The student will use manipulatives to estimate and solve problems involving length, weight, volume, capacity and time.

LEARNER OBJECTIVE

The student will estimate, count and measure the amount of paper that is consumed in a classroom daily.

LESSON

A. Step-by-Step Instructions

1. Bring two empty trash containers to class. Label one "white paper" and the other one "colored paper."
2. Explain to students that for one day they will sign or initial every sheet of paper they throw in the trash. All the white paper will go in the trash can labeled "white paper," and all the colored paper will go in the trash can labeled "colored paper."
3. At the end of the day have students estimate how many sheets of paper are in each recycling box. Have students estimate the number of sheets of paper he or she personally used. Check the results by counting and recording this information on the board for everyone to view.
4. The following day have students create bar graphs showing the total amount of paper used by the class on the previous day. Then have each student create a bar graph showing how much paper he or she used.

B. Background

Paper was first produced in China around 105 AD. Ts'ai Lun, a court official, figured out a way to make paper by shredding the bark of a mulberry tree and mixing it with scraps of linen and hemp. He added water and beat the mixture into pulp. He made a frame of bamboo, with a cloth bottom, which he dipped into the pulp. Then he let it dry until he could pull it off the frame in a sheet.

Four hundred years later, the Mayans of Mexico and Central America invented a kind of paper made from the fig tree. The bark was softened by beating and treated with water and lime to remove the sap. Then the mixture was spread out on flat boards to dry and peeled off in sheets. The Mayans were also probably the first people to produce books with hard covers.

Muslims from Eastern Asia learned to make paper when they invaded China in the Eighth Century. After that, they invaded Europe and taught people there how to make paper. Before that, people in Europe wrote on animal skins, if they wrote at all. England started manufacturing paper in large quantities during the 16th century. The first paper mill in the United States was built in Philadelphia in 1690.

Today the United States is the largest producer and consumer of paper and paper products in the entire world. Just one issue of the Sunday New York Times uses 65,000 trees. In 1990 each American used about 663 pounds of paper products. By contrast, a resident of China only uses about 28 pounds a year.

Trees are a renewable resource, which means when we cut them down we can grow more. But cutting too many of them at once can cause soil to erode away. The soil washes into waterways and clogs up rivers and streams. Trees also need plenty of space to grow. Many of our forests have been cut down to

make way for shopping malls and housing developments.

Many trees today are grown on farms, just to provide trees for paper and other wood products. In northeastern Oklahoma there are plantations of loblolly pine grown for that purpose. Loblolly pine is a kind of tree that grows very quickly. In some parts of the south, farmers have stopped growing crops like cotton and let their land go back to pine forest, because, in some cases, selling trees is more profitable than raising traditional crops.

Source: Oklahoma Cooperative Extension Service, Forestry, OSU

C. Resources

Books

Burnie, David, *Trees*, Eyewitness Books, Knopf, 1988.
Buscaglia, Leo, *The Fall of Freddie the Leaf*, Charles B. Slack, 1982.
Dickinson, Jane, *All About Trees*, Troll, 1983.
Kalman, Bobbie, *Buried in Garbage*, Crabtree, 1991.
Seuss, Dr., *The Lorax*, Random House, 1971.

Additional Resources

American Paper Institute, 1250 Connecticut Avenue N.W., Washington, DC 20038 (free poster and pamphlet on how to make paper in the classroom).

"Caring for the Forest," California Women in Timber, P.O. Box 543, Pioneer, CA, 95666 (free poster, with activity master, showing management, benefits and products derived from trees).

"Caring for Planet Earth," Oklahoma Cooperative Extension Service, 4-H and Youth Development, 205 Poultry, Stillwater, OK 74078 (free packet of lessons for grades 4-6 addressing environmental issues).

D. Evaluation

Were the students surprised at the amount of paper they used in one day? Were they able to successfully complete the graphs?

E. Related Activities

1. Encourage your class to start a schoolwide recycling campaign. Have students decorate recycling boxes with shelf paper or some other adhesive-type paper, label the boxes, and distribute them to other classes. The students should be responsible for collecting the recyclable paper twice a week and bundling it for the recycling center. Enlist the help of three or four parents to take turns delivering the recyclables to the recycling center. Have students count papers from each classroom and use bar graphs to find which classrooms are most aggressive in their recycling efforts. Display the graph where classmates and visitors can view the results.
2. Bring a clear container to class, and fill it with candy, pencils, erasers, etc. Leave the container on display for the month, and have students estimate the number of objects inside. Count the contents of the container as a class. The person with the closest estimate wins what's in the container. Continue for several months, always using the same container. Have students create graphs to keep track of their estimates, so that they can see if their estimates improve with time.
3. Do without trash cans in your room for one day. Instruct students to crumple their paper and toss it on the floor if they need to throw it away. At the end of the day, discuss the amount of paper on the floor. Have students inspect some of the discarded paper and discuss how much was wasted and how much was used as much as possible. Encourage students to brainstorm on how to cut down on paper use in the classroom. Have everyone help pick up the paper before dismissing the class for the day.

SNACK SACK

SUBJECT: Mathematics GRADE: 3-4

AGRICULTURAL TOPIC: Nutrition CONCEPT: I

STUDENT SKILL
The student will apply concepts of probability and make predictions.

LEARNER OBJECTIVE
The student will experience the concepts of ratio and production, using agricultural products that can be considered snack foods. Students will analyze and record information from the class experience.

LESSON

A. Step-by-Step Instructions

1. Prepare three lunch-size paper bags, using the following snack foods:
   Bag # 1 - Five peanuts, one whole wheat cracker, one kernel of popcorn.
   Bag # 2 - One peanut, five whole wheat crackers, one kernel of popcorn.
   Bag # 3 - Three peanuts, three whole wheat crackers, one kernel of popcorn.
2. Make three signs, printed with the following statements:
   "You are more likely to draw a peanut from this bag than a whole wheat cracker."
   "You are more likely to draw a whole wheat cracker from this bag than a peanut."
   "You are just as likely to draw a peanut from this bag as a whole wheat cracker."
3. Display the lunch bags. Explain to the students that there are seven snack foods in each of the bags, but do not tell them what kind of snacks are in the bags.
4. Display the signs, and instruct students to read them silently. Tell students the signs have fallen off the bags and that they will have to figure out which sign goes with which bag.
5. Have a few students reach into bag # 1, without looking, pull out a snack item, note what the snack is, and return it to the sack. Have one student record the information on the chalk board as the items are returned to the bag.
6. Challenge students to predict which sign matches bag # 1. Ask students how they arrived at their predictions. Allow students to continue taking samples if they are uncertain about which sign matches bag # 1.
7. Repeat the exercise for the other two bags.

B. Background

Snacks aren't all bad. In fact, they should be an important part of your diet. It's just that some of our favorite snacks have given snacks a bad name. Most brands of potato chips have large amounts of fat and salt, and those chocolate chip cookies you like so well are loaded with fat and sugar. You don't have to cut out the goodies altogether, but you should make sure you don't eat more of those foods than anything else. Try sampling a variety of snacks instead of reaching for the potato chips and a soft drink every day. Unbuttered popcorn is a delicious snack that is also nutritious. Nuts and sunflower seeds are loaded with fat, but they're also loaded with many of the nutrients your body needs. Fresh fruit is a wholesome way to satisfy your sweet tooth, and carrot sticks can provide a satisfying crunch. Potato chips, candy, cookies and soft drinks are all snacks you should save for special occasions, maybe once or twice a week.

Source: Oklahoma Cooperative Extension Service, Nutritional Sciences, OSU

C. Resources

Books

Anderson, George, *First Thanksgiving Feast,* Random House, 1990.
Barrett, Judi, *Cloudy with a Chance of Meatballs,* Macmillan, 1978.
Carle, Eric, *The Very Hungry Caterpillar,* Putnam, 1991.
Cole, William, ed., *Poem Stew,* Harper Collins, 1981.
Howe, James, and Deborah Howe, *Bunnicula: A Rabbit Tale of Mystery,* Avon Camelot, 1979.

Additional Resources

American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.
"Nutrition Unit: Big Ideas Secrets of Success," Associated Milk Producers, Inc., 6240 E. 15th, Tulsa, OK 74112, 918-835-6933 (free nutrition unit for grades 4-5).

D. Evaluation

Were the students able to understand how they made their predictions by taking out one sample at a time from the sack? Were they able to gather and use the recorded information to match the correct signs to the correct sacks?

E. Related Activities

1. Bring in a wide assortment of packaged snack foods, and have students read the information provided on the labels. Have students rank the snack foods from most nutritious to least nutritious, based on how much sugar, salt and fat each contains and how much of the Recommended Daily Allowance of nutrients are listed on the package.
2. Have students take random surveys during recess or lunch to find out what their schoolmates' favorite snacks are. Have students tabulate their information, combine it, and make a pictorial graph to display in the cafeteria.
3. Have students plan, prepare and serve healthy snacks to a kindergarten class for one week.

EASY AS PUMPKIN PIE

SUBJECT: Mathematics GRADE: 3

AGRICULTURAL TOPIC: Horticulture CONCEPT: I

STUDENT SKILL

The student will use manipulatives, models, known facts, properties and relationships to explain thinking processes.

LEARNER OBJECTIVE

The student will demonstrate place values, using pumpkin seeds as a math manipulative.

LESSON

A. Step-by-Step Instructions

1. Divide class members into groups of four or five students. Cut the tops from enough pumpkins to provide one pumpkin for each group.
2. Have group members examine their pumpkins, and review the term "estimate." Ask each group to estimate the number of seeds in their pumpkin. Write the group estimates on the board.
3. Hand out three sheets of construction paper, and instruct the groups to tape them together in a row to create place value boards. Have one member of each group write the place value terms -- "ones" across the top of the first sheet of construction paper, "tens" across the top of the second sheet and "hundreds across the top of the third sheet.
4. Give each group 10 small cups (paper muffin cup, bathroom cups, nut cups) and two large styrofoam cups. Keep extra containers handy in case any of the pumpkins have unusually large numbers of seeds.
5. Have students scoop the seeds from the pumpkins with their hands and place them on the construction paper labeled "ones."
6. Have students count the seeds into groups of ten, place them in the small cups and place the filled cups on the construction paper labeled "tens." When students have counted ten groups of ten they should dump those cups into the larger cups and place them on the construction paper labeled hundreds.
7. Have students continue the activity until all the seeds have been counted. Then have them write and read the exact number of seeds in their pumpkins. Have students compare the exact numbers with their estimates.

B. Background

Pilgrims and other early American settlers made the first pumpkin pies by burying pumpkin in the ashes of their fires. After a pumpkin had cooked, they would cut off the top, scrape out the pulp and add honey or maple syrup. The pulp was then made into delicious pies and breads. Pumpkins were used for many different things. Dried pumpkin shells served as bowls or containers for storing grains and seeds. Pumpkin seeds were dried and roasted for a high-energy treat.

Source: Oklahoma Cooperative Extension Service, Horticulture and Landscape Architecture, OSU

C. Resources

Gillis, Jennifer, *In a Pumpkin Shell: Over 20 Pumpkin Projects for Kids,* Storey, 1992.
Jennings, Terry, *Seeds: Junior Science,* Watts, 1988.
Tudor, Tasha, *Pumpkin Moonshine,* Random House, 1989.

D. Evaluation

Were the students able to understand the place value concept? Did any group's estimate come close to the actual number?

E. Related Activities

1. Roast pumpkin seeds. Wash them, and place them in a vegetable steamer with some water. Cover and cook for 30 minutes. Dry the seeds with a towel. Spread them out on a cookie sheet, brush with vegetable oil and sprinkle with salt. Bake the seeds in a preheated 300-degree oven for 30 minutes, or until golden. Serve them to students as a snack.
2. Save some of the pumpkin seeds in a jar or envelope to plant in the spring. Have students plant the seeds in paper cups and chart the growth of the plants. Let students take the seedlings home to plant them outdoors at the end of the school year. Pumpkins grow to maturity in about 100 to 120 days depending on the variety.
3. Make pumpkin seed art. Bake clean seeds in a 300-degree oven for 30 minutes, or until golden. Let the seeds cool completely. Provide students with tempera paint in autumn colors, and have them dip the pumpkin seeds in the paint. Let the seeds dry. Have students draw tree trunks with branches and glue seeds to the branches to make beautiful full trees.
4. Make pumpkin seed jewelry. Have students string the seeds with needle and thread while they are wet. Hang the strands to let them dry. After they have dried, provide students with tempera paint and have them dip the strands in the paint and hang to dry again. Advise your students that the paint will rub off and the seeds will become sticky in damp weather.
5. Have students draw Jack-o-lanterns, color them and use different kinds of seeds to make their features.

THE GRAIN GAME

SUBJECT: Mathematics **GRADE:** 3

AGRICULTURAL TOPIC: Grains **CONCEPT:** I

STUDENT SKILL
The student will draw logical conclusions about mathematical ideas and concepts.

LEARNER OBJECTIVE
The student will use pieces of cereal made from grains grown in Oklahoma to play a counting game.

LESSON

A. Step-by-Step Instructions

1. Four to six students can play at one time. Fill a bowl with breakfast cereal made from oats (Cheerios), corn (Kix or Corn Chex) or wheat (Wheat Chex, Spoon-Size Shredded Wheat).*
2. The object of the game is for the student to accumulate 25 cereal pieces. The players take turns rolling a number cube and taking the number of cereal pieces indicated on the number cube from the bowl.
3. When a player gets close to accumulating 25 cereal pieces, he or she must decide whether or not to take the number of pieces indicated on the number cube. If the player decides not to take the number indicated on the number cube, he or she must wait a turn to roll again. The player will then try to roll the number needed or a number as close as possible to the winning number, 25.
4. The person who is closest to 25 is the winner and may eat the cereal pieces.

B. Background

Grains supply your body with carbohydrates, protein, iron, thiamine and niacin. The U. S. Department of Agriculture recommends six to 11 servings of grain a day per person, depending on the age of the person. Cereals are a great way to get some of the servings you need from the grain group. Breads, pasta, muffins and hamburger buns are also made from grains. Rice, oats and barley are whole grains that can be eaten as hot breakfast cereals or added to soups and other dishes.

The grain most widely grown in Oklahoma is hard winter wheat. Hard wheats are best for making breads that keep for a long time. Soft wheats are used more often in pastries. Oklahoma is the number two producer of winter wheat out of all the 42 other states that grow it. Other grains grown in Oklahoma are oats, barley, corn, sorghum and rye.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Aliki, *Corn Is Maize, The Gift of the Indians,* Harper Collins, 1976.
DeWitt, Jamie, *Jamie's Turn,* Raintree, 1984.
Galdone, Paul, *The Little Red Hen,* Seabury, 1973.
Gibbons, Gail, *Farming,* Holiday House, 1988.
Johnson, Sylvia, *Wheat,* Lerner, 1990.

Additional Resources

"Wheat for Kids," Oklahoma Wheat Commission, 800 N.E. 63rd St., Oklahoma City, OK 73105, (405) 521-2796 (booklet).

American Institute of Baking, 1213 Baker's Way, Manhattan, KS 66502.

D. Evaluation

Did students enjoy the game and the chance to use grain foods as manipulatives?

E. Related Activities

1. Make whole grain muffins in class, and eat them as a morning snack. Spread butter made by the shake method over the muffin.

Butter Recipe

1 cup whipping cream at room temperature
small jar with secure lid
bowl
wooden spoon

Pour whipping cream into the jar. Screw on lid and shake vigorously. Have students take turns shaking the jar for approximately 10 minutes. Pour the buttermilk (bluish white liquid) and the butter (clumps of yellow fat) into the bowl. Pour off the buttermilk. Wash the butter with cold water. Press the butter against the side of the bowl using the wooden spoon. Repeat the process until the water runs clean. Press all the excess water out of the butter. Sprinkle with salt to taste.

** Use of brand names does not imply endorsement by Oklahoma Cooperative Extension Service or the Oklahoma Department of Agriculture.*

SEED SWAPPING

SUBJECT: Mathematics GRADE: 4

AGRICULTURAL TOPIC: Horticulture CONCEPT: I

STUDENT SKILL
The student will use manipulatives, models, known facts, properties, and relationships to explain thinking processes.

LEARNER OBJECTIVE
Students will practice and review place values, using seeds as manipulatives.

LESSON

A. Step-by-Step Instructions

1. Bring four number cubes and a variety of seeds (unpopped popcorn, sunflower seeds, pumpkin seeds) to class.
2. Divide students into four groups, and hand out a student game sheet to each member of the group. Provide each group with one number cube and three different kinds of seeds. Have the groups assign place values to each kind of seed, for example, if a corn kernel represents the ones place, 10 corn kernels would be equal to one sunflower seed, and 10 sunflower seeds would be equal to one pumpkin seed.
3. The first player should roll the number cube and place the indicated number of corn kernels in the left column on his or her game sheet. Each student should take a turn rolling the number cube. For the second round, the student places additional kernels on the game sheet, according to the number that appears on the number cube. When the total number of seeds in the left column reaches 10 or more, the player must trade 10 of those for one of the seeds chosen to represent tens.
4. The game continues until one player has accumulated 100 points, which he or she will trade for the winning seed (the seed chosen to represent hundreds).
5. After several games, allow each group to use two number cubes for a faster game, or raise the winning number of points to 1,000, and reward the winners with bags of peanuts or sunflower seeds.

B. Background

A seed is a miniature plant. Most seeds have a built-in food supply that is rich in carbohydrates, fats and proteins. For that reason seeds are a rich source of food for people and animals. Seeds are important to Oklahoma agriculture. Many of the crops grown on Oklahoma farms are harvested for their seeds. Pecans are seeds. Soybeans and corn are seeds from which we get salad oil. The candy bars you eat probably are made with soybean or corn oil. Soy ink is made from soybeans also. Cottonseed oil is used as a base for paints.

Seeds come in an amazing number of shapes and sizes. In the fall you can find many different kinds of seeds lying on the ground. Sometimes you see them flying in the air. If you have maple or elm trees in your yard you have seen seeds with wings. That is one of the ways seeds travel. Dandelion and thistle seeds are very light so they can travel on the wind, sometimes as far as 1,000 miles away. Some kinds of seeds grab onto the fur of animals or on your clothes to travel from place to place. Stickers are seeds that try to hitch rides on the bottoms of your feet. The pods of some plants explode and shoot out their seeds. Pecans often

grow along creeks, so their heavy seeds travel by water. Birds eat the berries of honeysuckle, hackberry, mulberry and other plants, then deposit them, sometimes hundreds of miles away. Acorns are the seeds of oak trees. Squirrels gather them and carry them away to hiding places. Some seeds even travel by coasting on the snow or ice.

Source: Oklahoma Cooperative Extension Service, Horticulture, OSU

C. Resources

Books

Gillis, Jennifer, *In A Pumpkin Shell: Over 20 Pumpkin Projects for Kids,* Storey, 1992.

Heller, Ruth, *The Reason for a Flower,* Putnam, 1992.

Kellogg, Steven, *Johnny Appleseed,* Morrow, 1988.

Merrill, Claire, *A Seed Is A Promise,* Scholastic, 1990.

Additional Resources

National Sunflower Association, 1501 N. 12th, P.O. Box 2533, Bismark, ND 58502.

D. Evaluation

Did the students enjoy practicing place value with classmates, using seeds or the place value pieces?

E. Related Activities

1. Make seed mosaic pictures, using pattern pages found in the back of the book.
2. Roast and eat pumpkin seeds. Toss clean, dry seeds in a bowl with one tablespoon of oil until the seeds are evenly coated with oil. Spread the seeds on a cookie sheet, and bake at 350 degrees for 30 minutes to an hour. Stir them every 10 to 15 minutes to make sure seeds are evenly toasted.
3. Have students collect seeds outdoors in the fall and sort them according to their mode of travel.
4. A coconut is the largest seed. It travels from one place to another by floating in water. Bring a coconut to class, place it in a pan of water, and have the students see if the coconut floats. To break open, first take an ice pick and puncture the softest eye of the coconut; then drain the coconut milk into a glass. If students plan to taste the coconut milk, strain the liquid through a light-weight cloth or cheesecloth. To get to the coconut meat, hit the shell with a hammer, then pry the meat away from the shell with a screwdriver or some type of blunt-ended tool. The brown skin covering the meat may be eaten, or a vegetable peeler may be used to remove it.

Name _____

Seed Swapping

pumpkin

oat

Write the name of the seed that will be used at the top of each column. Glue an example of the seed in the box beside the name. Follow the directions given by the teacher to complete the seed-swapping place value activity.

corn

_____ seed name	_____ seed name	_____ seed name

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BE A BUG SCOUT

SUBJECT: Mathematics GRADE: 4

AGRICULTURAL TOPIC: Insects CONCEPT: IV

STUDENT SKILL

The student will collect, organize and interpret data gathered from real-world situations and record data on the frequency of events.

LEARNER OBJECTIVE

The student will count bugs or specified weeds in a given area to experience how farmers decide whether to use pesticides or not.

LESSON

A. Step-by-Step Instructions

1. Share background information.
2. Divide your class into groups of three or four. Take the class outdoors on a day in spring or late summer. Provide each group with a yard stick or tape measure and stakes for marking off a specified area in a grassy part of the school yard. Stakes may be craft or popsicle sticks, pencils or paint sticks.
3. Instruct students to count all the insects they can find within the area marked off by their group and record the data on the student worksheet. Caution students not to harm the insects. As an alternative, have students count all the dandelions, henbit or other common weeds within the staked area.

B. Background

There are lots of insects in Benny Johnston's cotton field, and that's fine with him. Many of the insects are helping him by attacking insect pests that damage his cotton.

Twenty years ago, Mr. Johnston probably would have sprayed his fields with pesticides every five days. A pesticide is anything used for controlling a pest. When you put a flea and tick collar on your dog, you are using a pesticide. When your parents put out roach motels to control roaches, they are using pesticides. When city workers pour chlorine into the city pool, they are using pesticides.

For many years, farmers have depended upon pesticides to help them grow bountiful crops. But pesticides are expensive, and sometimes they don't work. If the farmer isn't careful, the pesticides can also get into the water that we all have to drink.

For those reasons, many farmers are looking for different ways to control insects and weeds. Instead of just automatically spraying pesticides on their fields every year, they will try several different methods of pest control. This is called ***Integrated Pest Management.***

Many cotton and alfalfa farmers will "scout" their fields to find out how many weeds or bugs are out there and what kind. Then they decide what to do. Benny Johnston has cotton bollworms in his fields. The cotton bollworm is a caterpillar that eats corn, cotton, soybeans, lettuce, tomatoes and other crops. It costs farmers $2 billion each year and is one of the most damaging insects in the world.

But Mr. Johnston doesn't want to spray pesticides in his field. Pesticides don't just kill the bad guys, like the cotton bollworm, but also the good guys, like the wasps in Mr. Johnston's cotton field that attack the cotton bollworm.

When the cotton bollworm feeds on the cotton plant, the cotton plant gives off distress chemicals. The chemicals attracts the attention of predators, like lady beetles, the wasps and other predators, which go looking for the caterpillars.

When a female wasp locates the cotton bollworm, it attacks and lays a single egg inside the worm's body. The wasp egg hatches inside the worm within a few

days and begins to feed on its blood and fat. Other predators eat the eggs and small larvae of the cotton bollworm.

Encouraging beneficial insects is only one method of pest control. Some farmers keep pests away by clearing areas where they like to reproduce. Another method farmers can use is crop rotation. If the farmer grows a different crop in his field each year he can fool the pests into staying away. That's because different pests attack different crops. The worms would have to go somewhere else if they went back to Mr. Johnston's cotton field the next year and found that he had planted alfalfa hay in that field. Crop rotation keeps pest populations from growing too much in one field from year to year.

Some farmers decide to go ahead and use pesticides, but they are careful to use them safely and responsibly. After they scout their fields they decide how much pesticide they should use and exactly which kind would work best on the pests in their fields that year. Some years they may decide not to use them at all.

Source: Oklahoma Cooperative Extension Service, Integrated Pest Management, OSU

C. Resources

Books

Bernhard, Emery, *Ladybug,* Holiday, 1992.

Goor, Ron, and Nancy Goor, *Insect Metamorphosis: From Egg to Adult,* Macmillan, 1990.

Selsam, Millicent, *Backyard Insects,* Scholastic, 1988.

Snedden, Robert, *What is an Insect?* Little, 1993.

Souza, Dorothy, *Insects Around the House,* Carolrhoda, 1991.

Souza, Dorothy, *Insects in the Garden,* Carolrhoda, 1991.

Souza, Dorothy, *What Bit Me?* Carolrhoda, 1991.

Suzuki, David, *Looking at Insects,* Wiley and Sons, 1992.

Additional Resources

"Agri-Balance: Not a Drop to Drink?" The Fertilizer Institute, 501 2nd St., NE, Washington, DC 20002 (VHS videotape about agriculture's impact on groundwater, free loan).

4-H Entomology books (contact the Oklahoma Cooperative Extension Service office in your county).

"The Reliable Farmer," Sperry New Holland, P.O. Box 6219, Stockton, CA 95206, Attn: Phawanda Cochran.

D. Evaluation

Did students enjoy counting the insects or weeds? Were they able to record the data on the worksheet?

E. Related Activities

1. Have students use 4-H Entomology manuals or insect books from the school library to identify the bugs they have drawn as harmful or beneficial to the farmer.
2. Have students create bar graphs, showing how many of each kind of insect they found.
3. Have each group write its findings on the board and total the number of bugs and the total area measured by the class.
4. Have students hypothesize why their estimates did or did not come close to the actual number of insects. Was the school ground sprayed to control weeds or insects last spring? Has a cold front moved through the area recently? Was your plot in a high traffic area?
5. Have students create fractions based on the number of bugs they found, for example, 1/10 of the bugs in John's area were ants, 1/5 of the bugs in Mary's area were ladybugs.
6. Have students write stories about the lonely bugs they find all alone in their specified areas.

Name _____

Be a Bug Scout

Count all the insects you can find in your bug plot.

Tally the number of insects you find.

*Make an estimate of how many bugs you might find.*_____

1. Count your tally marks to find out how many bugs you saw. Write the number. _____
2. Write two colors you saw on the bugs you found. _____ and _____
3. Were the bugs crawling on the ground or flying?_____
4. Did you touch any of the bugs? _____ What did they feel like?_____
5. How many legs does an insect have? _____
6. How many legs does a spider have? _____

On the back of this page, draw two of the insects you saw.

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BEESWAX

SUBJECT: Mathematics **GRADE:** 4

AGRICULTURAL TOPIC: Bees **CONCEPT:** I

STUDENT SKILL

The student will create and record perimeters and areas of polygons.

LEARNER OBJECTIVE

The student will complete a pattern of hexagons to understand what a honeycomb looks like.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheet, and have students follow directions.
2. After students have completed the honeycomb, instruct them to estimate how many cells are in the frame and record their guesses on their worksheets. Then have each student count the cells and record the actual number in the blank provided.
3. Share background material.

Activity adapted from "What's Buzzin'," National Honey Board, Attn: Mary Humann, 421 21st Ave., Ste. 203, Longmont, CO 80501-1421.

B. Background

Honeybees have special body parts for making wax. The wax comes out in white flakes from glands under the bee's abdomen. The glands degenerate in older worker honey bees, so most wax is made by young worker bees. The wax is white at first but gradually turns a golden color. The honeycomb is made up of six-sided cells. In the wild, the honeycomb is made from beeswax. This wax turns a rich chocolate brown or black. Commercial beekeepers provide honeycombs made of other materials. The bees use the honeycomb for storing food and protecting the queen's eggs. After they fill the cells with honey, they cap them with wax.

About 8 million pounds of beeswax is used in the U. S. each year. People use beeswax to make candles, lipsticks, cold creams, ointments, lotions, shoe polish, crayons, chewing gum and floor wax. In old times, sculptors used bleached bee's wax to hide mistakes in their sculptures. The best sculptors were proud to say their statues were "sine cera," or without wax. That is where we get the word, "sincere."

Source: Oklahoma Cooperative Extension Service, Entomology, OSU

C. Resources

Books

Heller, Ruth, *The Reason for a Flower,* Putnam, 1992.
Holly, Brian, *Hayes Book of Bugs and Critters,* Hayes, 1985.
Lord, John, and Jane Burroway, *Giant Jam Sandwich,* Houghton-Mifflin, 1972.
Ryder, Joanne, *Dancers in the Garden,* Sierra, 1992.

Additional Resources

"What's Buzzin'," National Honey Board, Attn: Mary Humann, 421 21st Ave., Ste. 203, Longmont, CO 80501-1421 (free educational kit for students in grades 4-6, including videotape, worksheets, poster and teacher's guide).

D. Evaluation

Were students able to complete the honeycomb? The actual number of six-sided cells in the frame is 156.

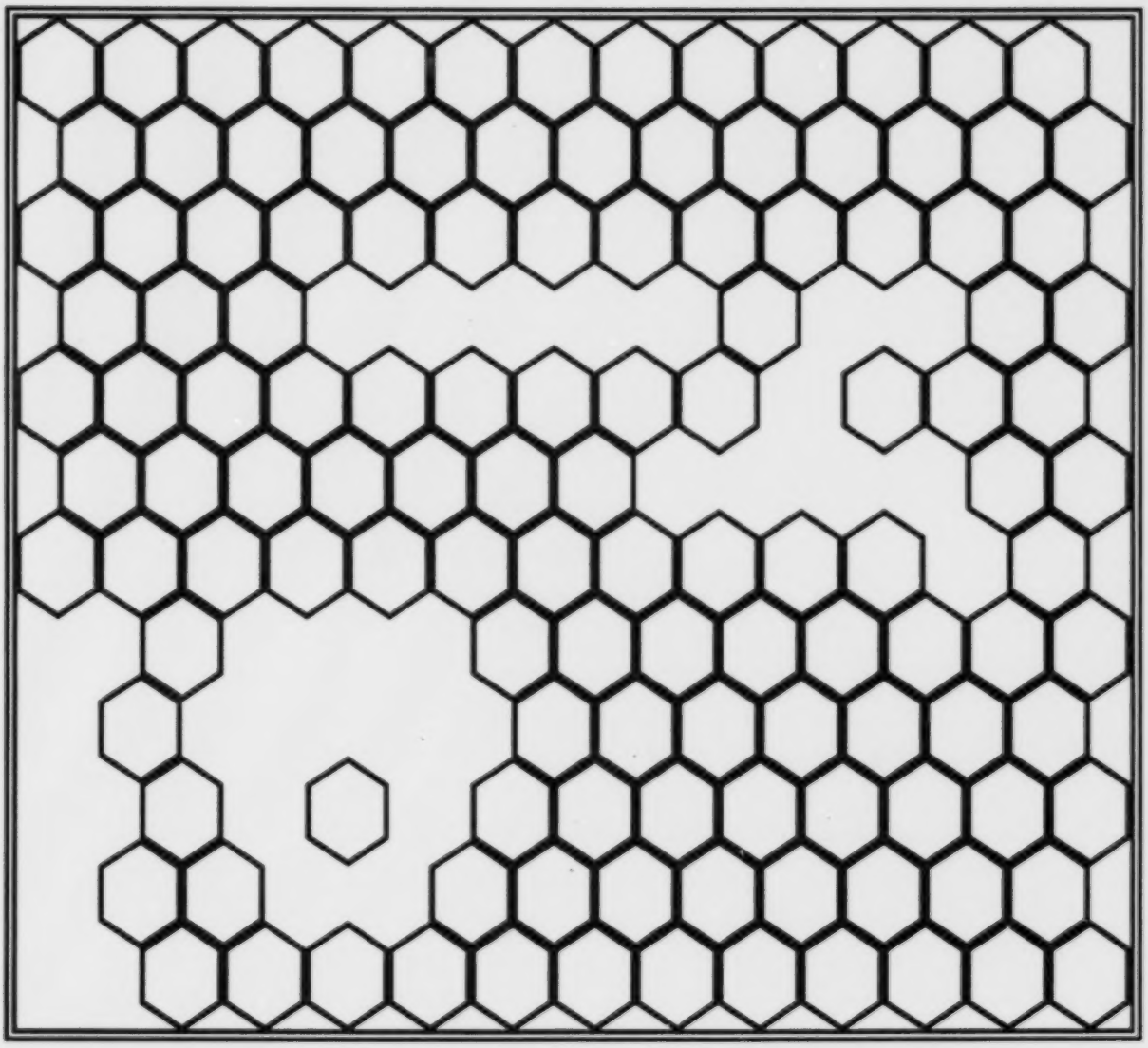
E. Related Activities

1. Acquire a honeycomb from a beekeeper, or buy honey with the honeycomb included, so students can see what a honeycomb looks like. Allow students to taste honey on crackers or bread. Keep in mind that some students may be allergic to honey.
2. Have students study the labels of products in their homes and list those that include bee's wax.
3. Discuss use of the word "sincere" and how the meaning has developed from its original meaning.

Name _____

Beeswax

Complete this frame of six-sided cells. Estimate how many cells make up this honeycomb, then count the cells.



Estimated number_____

Actual number_____

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GARDEN GRID

SUBJECT: Mathematics **GRADE:** 4

AGRICULTURAL TOPIC: Horticulture **CONCEPT:** IV

STUDENT SKILL

The student will investigate and develop the process of measurement and concepts related to nonstandard, customary and metric units.

LEARNER OBJECTIVE

The student will create a grid and plan a garden, allowing sufficient space for each plant to grow.

LESSON

A. Step-by-Step Instructions

1. Provide students with two copies each of the grid sheets provided at the back of the book, and instruct them to tape the two sheets together to form garden blueprints.
2. Hand out student worksheets. Instruct students to color the vegetables they want to grow, and cut them out.
3. Have each student plan his or her own garden, using the vegetable cut-outs, the grid and the chart showing how much space each vegetable needs.

B. Background

Crowded plants do not grow well. They rob one another of the space, fertilizer, water and sun necessary for healthy growth.

Carrots only need a small amount of space and are very easy to grow. They need well-worked, sandy soil so they will grow long, straight roots. Lumps and stones in the soil will cause the carrots to be deformed. Carrots are a good source of vitamin A and C.

Have you ever heard anyone talk about frost on the pumpkin? Since pumpkin is one of the last vegetables in the garden, it may get frost on it. However, pumpkins store better if they are cut from their vines during the warm days of mid-Autumn, before the first frost. Pumpkins need plenty of space to grow into sprawling vines.

Cantaloupe needs plenty of space to grow, too. Like the pumpkin, it grows on a vine that spreads out along the ground. Cantaloupe are also called muskmelon. They need plenty of sun and water and, like carrots, are a very good source of vitamins A and C. Each vine produces three or four fruits. When the fruit is ready it will break off the vine.

The sunflower is native to the Americas. To the Incas of Peru the sunflower represented the sun in their religious ceremonies. Sunflower seeds are a valuable source of many vitamins and minerals. When sunflower plants are young, their heads will turn to the sun each morning. Every part of the sunflower plant has an economic use. The flowers can be used to make yellow dye. The pith from the stalks floats better than cork, so it is sometimes used in life preservers.

Native Americans taught the European settlers to plant corn. Corn is pollinated by wind, so it must be planted in small blocks of three or four rows rather than in single rows. There are many different kinds of corn. Popcorn is made from one kind of corn that is allowed to dry on the stalk. The corn on the cob you like to eat is called sweet corn.

Radishes grow well when the weather is cool. They are easily started from

seed after the last spring frost. Seeds should be sown three to four inches apart. Radishes produce bright red swollen roots that are white inside. Their bright color and spicy taste make them a fun addition to a tossed salad. Radishes are a good source of vitamin C.

***Okra** is more common in Oklahoma and other southern gardens than it is in other parts of the country. That's because it needs plenty of sunshine and won't even poke its head out of the ground until the ground is very warm. In Louisiana okra is called **gumbo** because it is an important ingredient in a kind of soup by that name.*

*In August, 1820, Robert Gibbon Johnson stood on the steps of the Salem, New Jersey, courthouse and ate a **tomato**. His doctor had advised him against it. American colonists thought tomatoes were poisonous because they are related to belladonna and mandrake. Those plants are in the nightshade family and are very poisonous. Tomato leaves are poisonous to many insects, but Robert Gibbon Johnson proved the fruit is not poisonous to people. In fact, tomatoes are another excellent source of vitamins A and C.*

*One **bell pepper** has more vitamin C than an orange or a cup of strawberries. Peppers love warm soil and cannot tolerate frost. The pepper is another vegetable introduced to Europeans by natives to the New World. Bell peppers belong to a different family from that of black pepper, but they belong to the same family as the pepper from which chili powder is made.*

***Peas** are usually the first vegetable to be planted in the garden in the early spring. They like cool weather and must be harvested before it starts getting hot. Peas are an excellent source of vitamins A, B complex and C. Peas grow on vines. They grow best when they have something to climb, like a fence, a trellis or even dried tree branches stuck in the ground.*

Source: Oklahoma Cooperative Extension Service,
Horticulture and Landscape Architecture, OSU

C. Resources

Books

Bjork, Christina, and Lena Anderson, *Linnea's Windowsill Garden,* Farrar, Strauss and Giroux, 1988.

Delton, Judy, *Pee Wee Scouts #9, Spring Sprouts,* Dell, 1989.

Kuhn, Dwight, *More Than Just a Flower Garden,* Silver-Burdett, 1990.

Kuhn, Dwight, *More Than Just a Vegetable Garden,* Silver-Burdett, 1990.

Additional Resources

"A Child's Garden Seed Collection," Watch It Grow, 2560 Nickel Place, Hayward, CA 94545 (vegetable and flower seeds especially for a child's garden, $1).

D. Evaluation

Were students able to chart their gardens, allowing plenty of space for each plant?

E. Related Activities

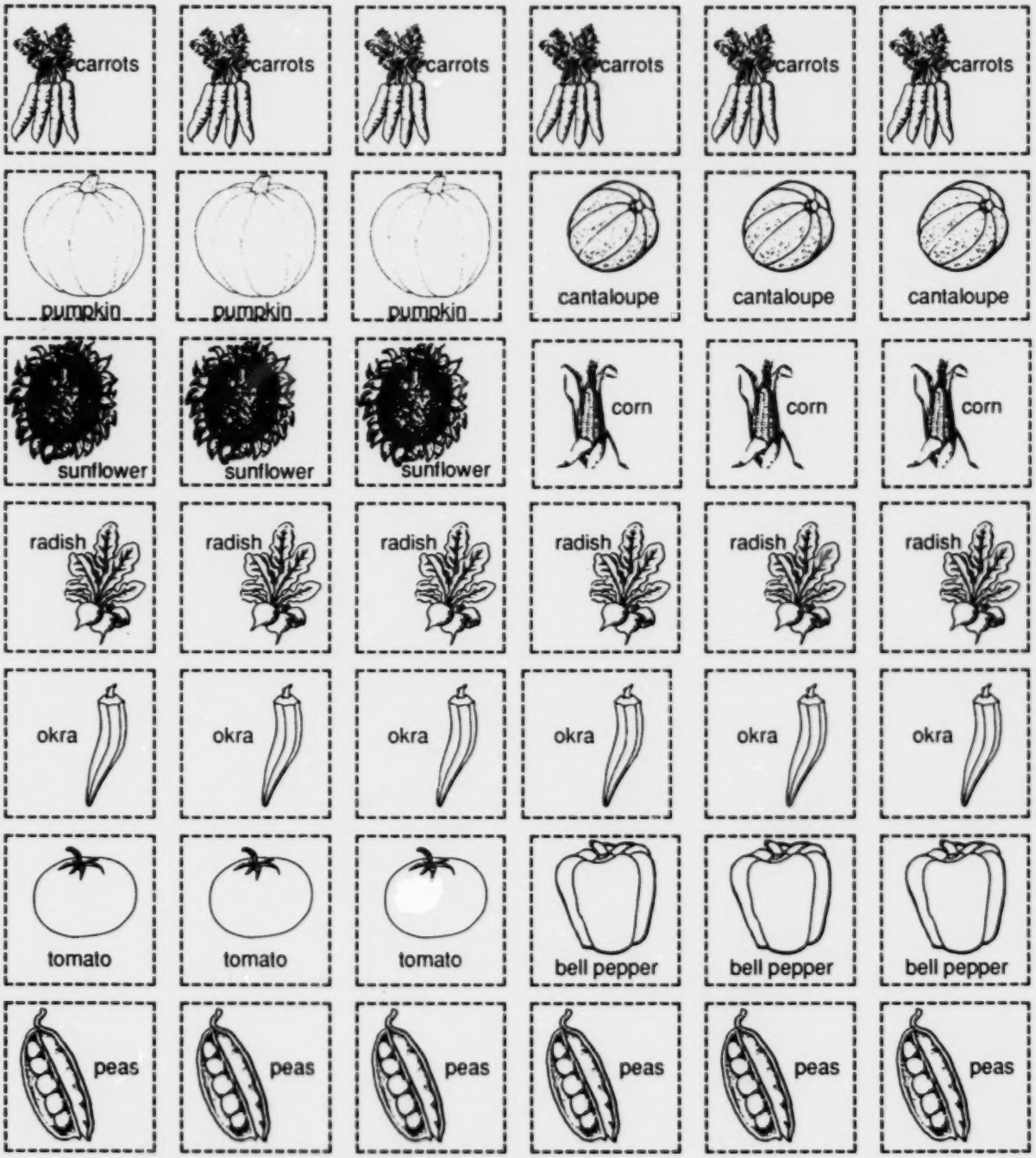
1. Make a classroom-size garden on the bulletin board, using the vegetable pattern page at the back of the book.
2. If you have space outdoors, have your class plan and plant a small outdoor garden in the spring, using early spring plants like radishes, lettuce, spinach and peas. Have students start the plants indoors in February to get a head start, or have students start their favorite vegetables in pots, then take them home for planting outdoors.
3. Bring seed catalogs to class, and photocopy a number of the order forms. Let students practice filling out the form and totaling the order for seeds they are interested in.

Name _____

Garden Grid

A

Color the vegetables, and cut out the ones you want to plant in your garden. Place the vegetables in the grid your teacher provides. Use the chart on worksheet B to decide how much space each vegetable needs. **1 inch = 1 foot**



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Name _____

Garden Grid B

Vegetables need space between them so they can get all the water and food they need. Some plants need more space than others. Plants like pumpkin and melons need plenty of space to spread out. Other plants, like radishes and onions, don't need as much space.

Gardeners usually plant their vegetables in rows. That way they can walk between the plants and take care of them.

Use this chart to decide how much space to leave between your vegetables. **1 inch = 1 foot**

Plant **cantaloupe** and **pumpkin** 2 feet apart, with 10 feet between rows.

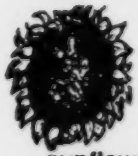
Plant **carrots** and **peas** less than 1 foot apart, with 2 feet between rows.

Plant **tomatoes** 3 feet apart, with 5 feet between rows.

Plant **okra** 1 foot apart, with 2 feet between rows.

Plant **radishes** less than 1 foot apart, with 1 foot between rows.

Plant **corn** 1 foot apart, with 3 feet between rows.

Plant **bell peppers** and  **sunflowers** 2 feet apart, with 3 feet between rows.

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MAKE MINE TURKEY

SUBJECT: Mathematics **GRADE:** 4

AGRICULTURAL TOPIC: Poultry **CONCEPT:** II

STUDENT SKILL
The student will formulate problems from everyday and mathematical situations.

LEARNER OBJECTIVE
The student will learn to interpret data in grocery advertisements and compute costs.
The student will create a menu and compute the cost of a turkey dinner.

LESSON

A. Step-by-Step Instructions

1. Starting a few weeks ahead, have students bring grocery ads to class.
2. Share background material. Students may complete the activity as a group project or on an individual basis.
3. Have students "shop" through the ads, making lists of the items they will need to prepare a turkey dinner. Students should decide how many people they want to invite to dinner and shop for the best buys.
4. Have each student write out the cost of each item on his or her list and compute the total cost of the meal.

B. Background

Turkey may have been on the menu for the first Thanksgiving. That's because the forests of the New World were full of all kinds of wild game, including wild turkey, quail, pheasant and deer. Turkeys run wild in many parts of Oklahoma today, but most people buy their Thanksgiving turkeys at the grocery store these days.

Wild turkey doesn't taste the same as ***domesticated*** *turkey. There are several reasons for that. Wild turkeys don't eat the same things as domesticated turkey. Wild turkeys have less white meat because they move around more and are not the same breed as domesticated turkeys.*

Most turkey producers provide large amounts of special food and water for their birds. Turkeys fed this way can grow to 25 pounds within five months.

Some Oklahoma farmers range-feed small flocks of turkeys. That means they turn them loose to find their own grain, weed seed and insects to eat. Five weeks before it's time to sell them, the farmer will start to feed them whole corn, so they'll get plump.

Turkeys are sometimes difficult to raise because they are very curious. They must be taught to eat from special feeders and waterers, just like other baby animals.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Aliki, *Corn is Maize: The Gift of the Indians,* Harper Collins, 1976.
Anderson, George, *First Thanksgiving Feast,* Random House, 1990.
Cohen, Miriam, *Don't Eat Too Much Turkey,* Dell, 1988.
Conaway, Judith, *Happy Thanksgiving: Things to Make and Do,* Troll, 1986.
Devlin, Wende, and Harry Devlin, *Cranberry Thanksgiving,* Macmillan, 1984.

Additional Resources

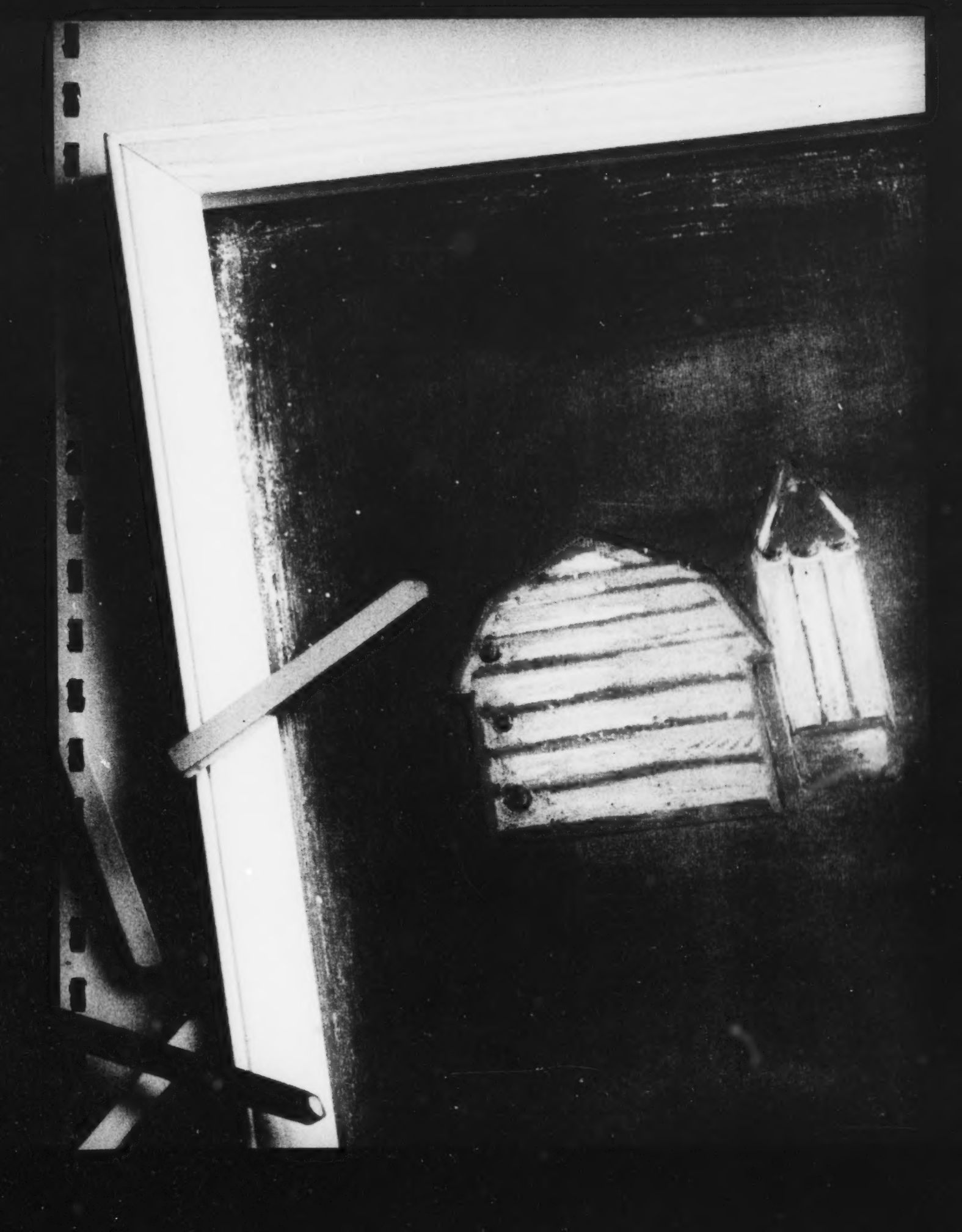
"It's Turkey Time," Yarnhill County Women for Agriculture, P. O. Box 101, Dayton, OR 97114 ($12 video).

D. Evaluation

The teacher should evaluate each meal plan on an individual basis. Did the students enjoy the activity?

E. Related Activities

1. Have students create well-balanced meals by cutting out pictures of different foods from magazines. Have them put their meals together by gluing the pictures onto paper plates.
2. Yams, or sweet potatoes, are also associated with Thanksgiving meals. Bring a sweet potato to class. Insert three toothpicks into the middle of the potato, and put it in a glass of water, with the toothpicks resting on the top of the glass. Have students keep a written or a picture record of the plant's progress.
3. Teach students how to serve the meals they have planned. Using paper plates, and plasticware, teach students the proper way to set a table and proper table manners. Have students practice during lunch.
4. Create a store in your classroom with empty cartons, cans, etc. Price the "groceries," and have students shop and buy with only $25 to spend. Or have them shop and create a meal from the packages found in the class grocery store. Then have students figure out how much they have spent.



CASE OF THE MISSING PUMPKIN

SUBJECT: Science **GRADE:** 3-4

AGRICULTURAL TOPIC: Composting **CONCEPT:** IV

STUDENT SKILL

Students will identify similar or different characteristics in a given set of objects, organisms or events.

LEARNER OBJECTIVE

The student will learn that, over time, pumpkins will decompose and return to the soil.

LESSON

A. Step-by-Step Instructions

1. During October bring a pumpkin to class. Clean it out, and carve a face. Place a candle inside, and use the pumpkin as a centerpiece. The burning candle will help speed up decomposition.
2. Cover the bottom of an aquarium with potting soil or garden soil. Mix leaves, sticks and grass clippings with the soil. Push the pumpkin into the soil so it is partially buried.
3. Moisten the contents of the aquarium with a spray bottle, and cover it with plastic cling wrap. Tape it so little or no air will get in.
4. Place a calendar near the aquarium. Mark the day the experiment began. Have students observe the aquarium and mark the calendar whenever anything significant occurs (the first day it "rains," the day the pumpkin's face caves in).
5. At the end of the school year, have students count how many days it took the pumpkin to decompose. Take off the wrap, and let students smell the inside of the aquarium and feel the pumpkin and the soil. Have students write adjectives describing the experiment on pumpkin cut-outs and tape them to the aquarium.

B. Background

Decomposition is nature's way of taking life and energy from dead plants and animals and changing it so new plants can use it. Bacteria and fungus eat the dead tissue from plants and excrete it in a form that helps live plants grow. These decomposers are so small you can't see them except when they are all massed together. That's the green, white or blue and furry stuff you've probably seen growing on food you keep in the refrigerator too long. Earthworms, land snails, slugs and even fly larva (maggots) are also important decomposers.

In nature dead plants and animals decompose and become humus for the soil. Humus acts as a sponge to help the soil hold water. It also traps air in the soil. Plants need air and water in the soil to grow. When the farmer plants crops in the soil, the growing crops take out nutrients. The farmer can replace those nutrients by tilling dead plants back into the soil and letting the decomposers go to work.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Dillon, Jane, *Jeb Scarecrow's Pumpkin Patch,* Houghton Mifflin, 1992.
Tudor, Tasha, *Pumpkin Moonshine,* Random House, 1989.
Cobb, Vicki, *Lots of Rot,* Harper Collins, 1981.

Additional Resources

The Growing Classroom. Teacher's Guide to Activities, General Feed and Seed/Let's Get Growing, 1900-B Commercial Way, Santa Cruz, CA 94065 ($33.75 plus $4 for shipping).

D. Evaluation

Did the student enjoy the activity and notice the gradual changes in the pumpkin?

E. Related Activities

1. Take a picture of the pumpkin each week. Make a photo or slide presentation to tell another class about the project. Students will write and deliver the narration. At the end, present the actual pumpkin in the aquarium.
2. Create a classroom compost and use the new soil to plant seedlings in the spring.
3. Try decomposing different types of refuse. See which one decomposes more quickly. Students will make their own hypotheses and write them in complete paragraphs. Do not use meat, dairy products or any fatty materials in the classroom compost.

PILE ON THE CHIPS

SUBJECT: Science GRADE: 3-4

AGRICULTURAL TOPIC: Beef CONCEPT: IV

STUDENT SKILL
Students will predict what might happen in a given scientific problem.

LEARNER OBJECTIVE
The students will examine dried animal waste and consider it as an alternative energy resource.

LESSON
A. Step-by-Step Instructions
1. Ask your county Extension office for help acquiring dried cow manure. Take it to class, and ask students to predict what will happen if it is burned.
2. Burn cow manure on a lab surface, or take it outside to burn. Let the manure burn completely down.
3. Wave the smoke in different directions so students can smell it. *Ask "What does it smell like? Is there any odor?"* Let students examine the ashes with a hand lens.
4. Scatter the ashes over the soil as a natural fertilizer.
5. Share background material.
6. Lead a discussion or ask students to write papers in which they answer the following questions:
Would burning manure be an alternative to the energy supply we have now? Why? Why not?

B. Background
Barter - to trade or exchange.
Early settlers on the Oklahoma Plains didn't find much wood to burn for firewood. When settlers found wood, they couldn't afford to burn it. They had to used it to make shelter. They had to find something else to burn.
One thing that was plentiful was animal dung -- manure left by cows, horses, and even buffalo. The settlers found that cow manure dries into hard "chips" which could be used as wood or coal for fuel. Settlers had a very limited supply of money. Many bartered with "chips" when they needed store-bought goods or services.
Manure burns down quickly to an ash that can be used as fertilizer. The settlers would leave the manure on the prairie until it was dry. Then they would gather it and store it in a dry place for future use.
People all over the world burn manure for cooking and to keep warm. Burning manure creates less air pollution than other fuels and gives off no odor. Forty tons of manure will generate enough electricity for 20,000 homes for an hour.
Source: Division of Agricultural Sciences and Natural Resources, OSU

C. Resources
Books
Cole, Ann, *Purple Cow to the Rescue*, Little, 1982.
Gorsline, Marie, and Douglas Gorsline, *Pioneers*, Random House, 1982.
Wilder, Laura Ingalls, *Little House on the Prairie*, Harper and Collins, 1975.

D. Evaluation

Did the students enjoy the experiment? Did the experiment spark discussion of alternative energy sources?

E. Related Activities

1. Weigh and measure the manure before the experiment. Weigh and measure the materials that remain after burning. Have students discuss whether or not this is an effective way of dealing with waste material?
2. Plant a seedling in regular potting soil and another in a mixture of soil and manure ashes. *Is there any significance difference between the growth of the two? Why? Why not?*
3. Have students discuss why cow manure is sometimes called "cow chips." Ask for other uses of the term "chip" (chip off the old block, potato chip, chocolate chip).

RINGS OF LIFE

SUBJECT: Science **GRADE:** 3-4

AGRICULTURAL TOPIC: Forestry **CONCEPT:** IV

STUDENT SKILL
Students will select appropriate predictions for given patterns of evidence.

LEARNER OBJECTIVE
The students will learn to determine the approximate age of a tree by looking at its rings.

LESSON

A. Step-by-Step Instructions

1. Enlist the help of parents who cut their own firewood in acquiring slices of three or four different tree trunks. Number the slices.
2. Discuss the rings of trees and how they are formed. Share background material.
3. Have students look at each tree trunk and tell the age and something about it. (drought, burns, injuries, rapid growth). Wipe a damp cloth or spray a furniture polish over the cross section the students are examining. This will enable the students to see the rings better.

B. Background

Have you ever looked at the trees in your community and imagined all the history that has taken place during their lives? There are many trees standing today that are older than our nation. In Oklahoma we have a number of historic trees. The Council Oak Tree in Tulsa was the meeting place of the Creek nation after those people were moved here from Alabama. The city of Tulsa has developed a park around that tree. In another part of Tulsa there is a tree that points the way to the Council Oak Tree. Members of the Creek Tribe staked the tree to the ground and forced it to grow so it would always point the way to their meeting place. Some other trees might have served as markers in the Oklahoma land run. Outlaws like Jesse James might have tied their horses to some of the trees in your community. Other trees may have served as hanging trees.

You can tell how old a tree is by counting its rings. Each ring represents one year's growth. The trunk's growth and the yearly cycle of blooming and hibernation combine to make a new ring each year. The outermost ring is the one that was formed during the last year of the tree's life. A ring is made up of one layer of light wood and one layer of dark wood.

You can also tell something about the tree's history by looking at its rings. In years when there is little rain, the tree will form a thin ring. A thick ring means the tree grew fast that year because there was plenty of rain. You can also tell if a tree has been burned or injured during any one year by looking at the rings.

Source: Oklahoma Department of Agriculture Forestry Services, OSU

C. Resources

Books

Hirschi, Ron, *Forest*, Bantam, 1991.
Romanova, Natalie, *Once There Was a Tree*, Dial, 1989.

Additional Resources

"Caring for the Forest," TAFP/Caring for the Forest, 629 S. Rancho, Santa Fe Road, No. 334, San Marcos, CA 92069, 619-744-4220 (poster and five ready-to-use activities to teach trees, wood products, careers and forestry management, $8.50).

National Tree Bank Program, 1455 Pennsylvania Ave. NW, Suite 250, Washington, DC 20004, 200-628-TREE (send for information on how your school or organization can participate in planting and caring for trees).

"Trees are for People," TAFP/Caring for the Forest, 629 S. Rancho, Santa Fe Road, No. 334, San Marcos, CA 92069, 619-744-4220 (mini-unit to teach awareness and appreciation of trees, $5).

Trees for Life, 1103 Jefferson, Wichita, KS 67203. (Write for information about the class tree planting kit.)

Witness Trees Program, Mark Bays, Urban Forestry Coordinator, Oklahoma Department of Agriculture Forestry Services, 2800 N. Lincoln Blvd., Oklahoma City, OK 73105-4298, (405)521-3864, Ext. 296. (Write or call about the Witness Tree Program.)

D. Evaluation

Answers will vary according to the tree samples you have in the classroom.

E. Related Activities

1. Choose a tree on or near your school yard, and have students identify some important events that might have occurred during the life of the tree. Students may use almanacs, encyclopedias, and old magazines and newspapers. Instruct students to include such things as their birthdays, presidents who were elected, the beginning and ending of wars, the year your school was built, the year your town was founded and scientific discoveries.
2. Have each student choose a tree in his or her own yard or in a nearby park and write its history. Instruct students to have the tree tell its own life story. Students should write their stories in spiral form to simulate the wood of the tree. To make bark, have students tear circles out of brown construction paper. Then have students cut out the center of the circle so the tree story will show through. Students should then glue the story and bark to construction paper or colored tag board.
3. Have students draw or paint the trunk and branches of a tree. In the fall, have students dip pieces of a cut-up sponge into orange, yellow and brown paint and dab it onto the bare branches. In the spring have students cut one-inch squares in different shades of pink tissue paper. Each student should place the square over the eraser end of a pencil, dip the end of the tissue-covered eraser in a small amount of glue and place them on the bare branches. This will create a work of art that looks like Oklahoma's state tree, the redbud.

THE WHEAT PLANT

SUBJECT: Science GRADE: 3-4

AGRICULTURAL TOPIC: Wheat CONCEPT: V

STUDENT SKILL

Students will identify properties by which a set of objects, organisms or events could be grouped.

LEARNER OBJECTIVE

The student will place stages of the life of a wheat plant in sequence and identify the six main parts of the wheat plant.

LESSON

A. Step-by-Step Instructions

1. In April acquire wheat in various stages of its life cycle -- kernels, ground wheat flour, wheat plant with the head still attached. Discuss the uses of wheat.
2. Contact an Extension agent for help in locating a complete wheat plant, including roots. Allow students to examine the plant. Point out the various parts of the wheat plant.
3. Share the background information.
4. Pass out student worksheets, and go over the directions with the class.

B. Background

Vocabulary

roots - A portion of the plant body that supports the plant and allows it to absorb the food supply.
leaves - *A lateral outgrowth of a stem of a plant.*
stem - *The main trunk of a plant.*
head - *The top part of a plant.*
kernel - *A whole grain or seed of a cereal, as in wheat or corn.*
awn - *Bristly fibers or beardlike appendage on the top of a wheat head.*

*Most Oklahoma farmers grow a kind of wheat called **winter wheat**. This type of wheat is planted and starts growing in the fall, rests during the winter and begins to grow again in the spring.*

*Before planting, the farmer must prepare the soil for the seed. He or she spends many hours on a tractor turning the soil and breaking it into fine particles. At last the soil is ready, the weather is right, and it is time to plant. The farmer puts the seed in the ground, using a machine called a **grain drill**.*

The moisture in the soil is what causes the wheat plant to start growing. As the plant gets bigger, it draws water and nutrients up through the roots and produces carbohydrates (food) in the leaves. A good supply of water, nutrients and food will allow the plants to grow tall and develop green leaves.

Wheat planted in the fall will grow about six inches tall before the first freeze. After that the plants stop growing, or become dormant, until spring. While the plant is dormant, the farmer may turn cattle into the fields to eat the tender first leaves. This does not harm the plants. In the spring they will produce new leaves.

The warmth of spring encourages the plants to grow again. Soon people driving along country roads can see lush green carpets, between two and four feet tall. Slowly, as the weather turns warmer, the wheat will mature and turn the green from tan to yellow and finally to a golden color that tells the farmer harvest is just ahead.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Mitgutsch, Ali, *From Grain to Bread,* Carolrhoda, 1981.
Roop, Peter, and Connie Roop, *Out to Lunch! Jokes About Food,* Lerner, 1984.
Sabin, Louis, *Agriculture,* Troll, 1985.
Tresselt, Alvin R., *Autumn Harvest,* Lothrop, 1951.
Turner, Dorothy, *Bread: Foods We Eat,* Carolrhoda, 1989.

Additional Resources

"Everything You Wanted to Know About Wheat," Kansas Wheat Commission, 2630 Claflin Rd., Manhattan, KS 66502-2743 (16-page booklet including games, craft ideas and information on the process of wheat production, free sample to teachers, 30 cents for multiple copies).

Oklahoma Wheat Commission, 800 N.E. 63rd, Oklahoma City, OK 73105.

"Wheat: Field to Oven," Kansas Foundation for Ag in the Classroom, Bluemont 124, Kansas State University, Manhattan, KS 66506 (26-page student activity book with background materials for teachers, $5).

"Wheat, Flour and Food," Oregon Wheat Commission, 1200 N.W. Front Ave., #520, Portland, OR 97209-28800 (15-page booklet provides history of wheat, information about making flour and nutritional information, one free copy).

D. Evaluation

A teacher's answer key is provided for both pages.

E. Related Activities

1. Plant some kernels of wheat in the classroom so students can watch the growth and development. Have students record the plant's progress on a calendar posted near the growing plant.
2. Invite a wheat farmer into the classroom to answer questions about wheat production.
3. Create a three-dimensional wheat plant on a door or board display. Use string to represent the root system (green for a young wheat plant, yellow for a ripe plant); make the stem of painted paper straws and the leaves of matching tissue paper. The head can be made of fuzzy pipe cleaners or craft fur rolled into a tube shape. Label the six parts of the plant.

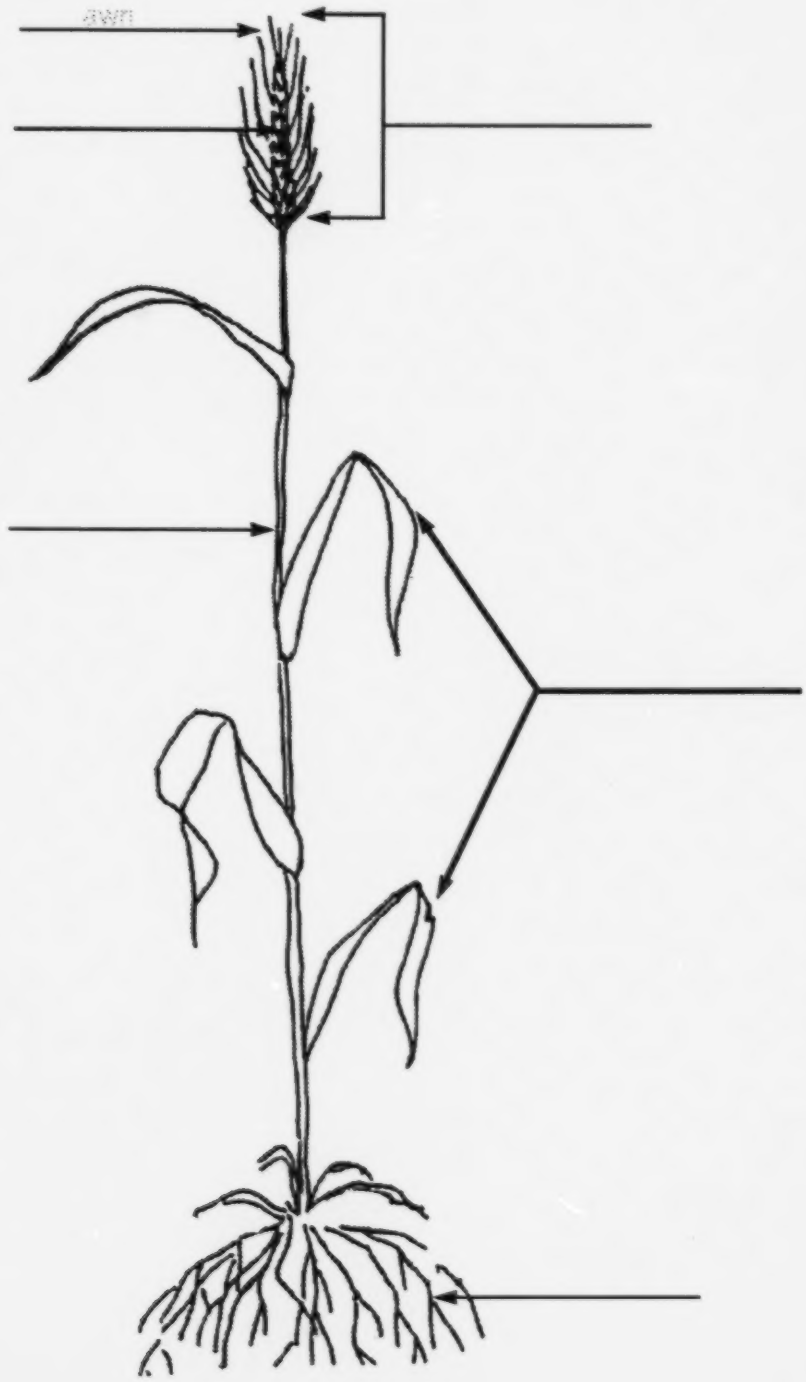
Name _____

The Wheat Plant

A

Fill in the parts of the wheat plant.

leaves
head
roots
awn
stem
kernel



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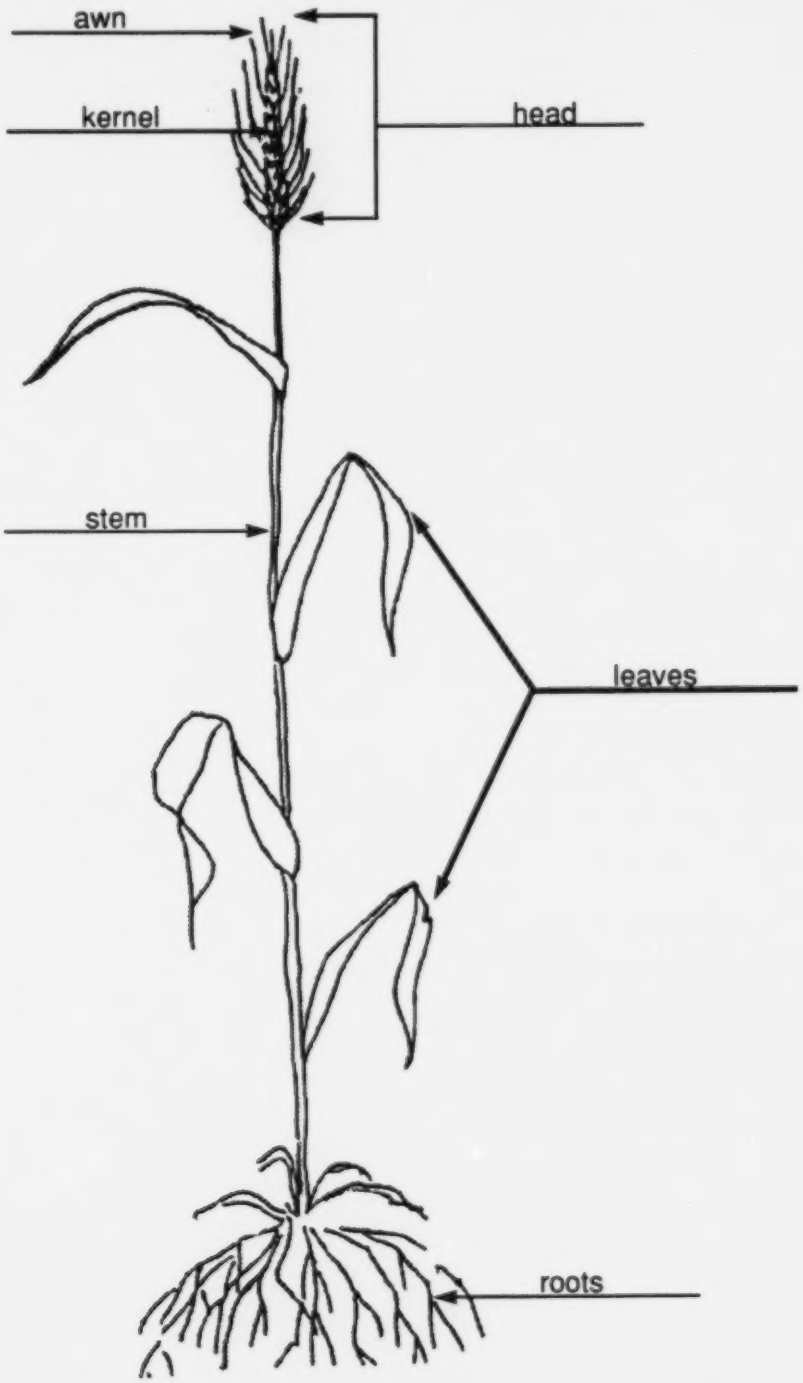
Name _____

The Wheat Plant (Answer Key) A

Fill in the parts of the wheat plant.

leaves
head
roots
awn
stem
kernel



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Name _____

The Wheat Plant B

Read the sentences below. Number the steps in order from one to nine to retell what happens to wheat, from seed to harvest.

____ The plant rests through the winter months.

____ The wheat is harvested.

____ A shoot grows up through the soil.

____ The full-grown plant turns from green to a golden color.

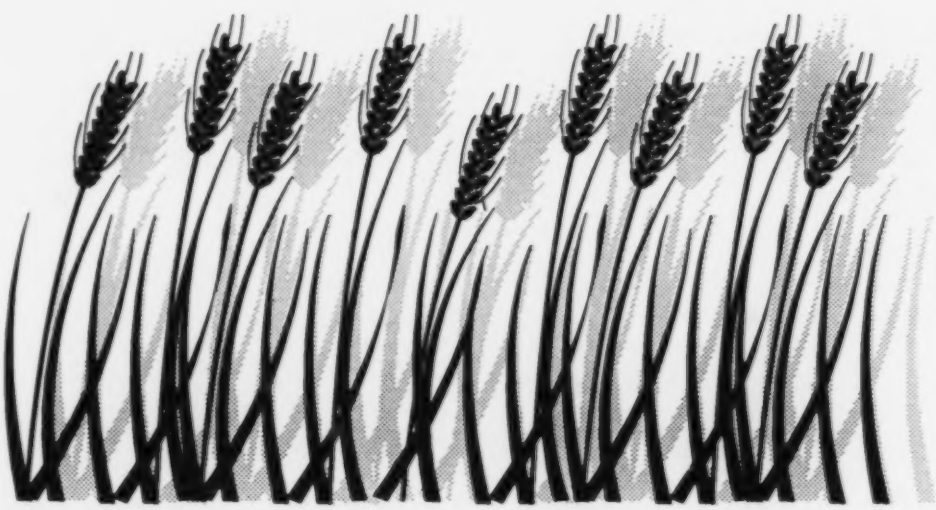
____ Wheat kernels are ground for food or saved as seed for planting next year's crop.

____ The soil is prepared for planting.

____ The plant continues to grow until there is a hard freeze.

____ In the spring, the plant grows quickly.

____ The grain drill is used to plant the wheat.



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TIN CAN TREAT

SUBJECT: Science **GRADE:** 3-4

AGRICULTURAL TOPIC: Nutrition/Dairy **CONCEPT:** V

STUDENT SKILL
Students will follow steps of a scientific problem in the proper order.

LEARNER OBJECTIVE
Students will conduct an experiment in which they change a liquid dairy product into a solid.

LESSON

A. Step-by-Step Instructions

1. Review the definitions of liquid and solid, and give oral examples of each.
2. Share the background material with students.
3. Divide the class into four groups, and provide each group with the the following ingredients to make "Tin Can Ice Cream:" one cup whole milk; 1/2 cup sugar; egg substitute equivalent to one egg; (DO NOT USE RAW EGGS IN THIS RECIPE. RAW EGGS CAN CONTAIN BACTERIA WHICH MAY CAUSE ILLNESS.) 1/2 teaspoon vanilla; one cup whipping cream.
4. Place all the ingredients in a one-pound coffee can. Place a tight-fitting plastic lid on the can. Place the can, with ingredients, inside a three-pound coffee can.
5. Pack crushed ice around the smaller can, inside the larger can . Pour at least 3/4 cup of rock salt evenly over the ice. Place a tight-fitting plastic lid on the three-pound can.
6. Have students take turns rolling the can back and forth for ten minutes across a sturdy table or cement floor. Open the outer can. Remove the inner can containing the ingredients. Remove the lid on the smaller can.
7. Use a rubber spatula to stir the mixture and scrape the insides of the can. Replace the lid on the one-pound can. Drain the ice water from the larger can. Return the smaller can to its place inside the large can. Pack the large can with more ice and salt.
8. Instruct students to roll the can back and forth for five more minutes. If mixture is still soupy after 15 minutes, the temperature may not be cold enough. Drain the excess water, add more salt and ice, and roll the mixture until it becomes firm. The recipe makes about three cups of ice cream. Provide fruit and nuts as toppings, as desired.

B. Background

Vocabulary

solid *- Not soft or fluid, not hollow, having its interior filled with matter.*
liquid - Flowing freely like water, fluid.
pasteurize *- To heat (a liquid) to a temperature (between 131 and 158 degrees Fahrenheit) which destroys certain undesirable bacteria and organisms .*

Ice cream is made by freezing, while stirring, a ***pasteurized*** *mixture of milk, cream, sugar, and a stabilizer. Eggs are sometimes added, and the ice cream is flavored with extracts, fruits, chocolate or nuts. Manufacturers whip air into the mixture during the freezing process to increase its volume as much as 80 to 100 percent.*

Ice cream should have a fresh flavor. It should be firm, and the texture should be fine-grained. If you can taste icy particles, that means your ice cream

has been melted at one time and re-frozen.

Ice milk is made like ice cream, but with less milk fat and more nonfat milk solids. Sherbet is a low-fat, frozen mixture of sugar, milk solids, a stabilizer, food acid and water. Fresh fruits, fruit juices, and extracts add the sweet flavor. Frozen yogurt has become a popular frozen dairy dessert in recent years because it has little or no fat but tastes as good as ice cream. Yogurt is made from milk that been curdled by a certain kind of bacteria.

The ice cream cone was invented on September 22, 1903, by an Italian man named Italo Marchiony. Americans didn't get their first taste of the ice cream cone until the following year, at the St. Louis World's Fair. Ice cream was already popular, because it was such a refreshing treat on hot days at the fair. One day one of the ice cream vendors ran out of dishes. The vendor in the next booth was selling waffles. The two put their heads together and came up with a solution to the problem. They rolled a hot waffle into a cone shape, cooled the cone, then dished cold ice cream into the opening. The American version of the ice cream cone was an instant success.

Source: Oklahoma Cooperative Extension Service, Nutritional Sciences, OSU

C. Resources

Books

Aliki, *Milk from Cow to Carton,* Harper Collins, 1992.
Rayner, Mary, *Garth Pig and the Ice Cream Lady,* Macmillan, 1978.
Ross, Catherine, *The Amazing Milk Book,* Addison-Wesley, 1991.
Sabin, Francene, *Louis Pasteur, Young Scientist,* Troll, 1983.

Additional Resources

Associated Milk Producers, Consumer Services, 1700 N. Sooner Rd., Route 4, Oklahoma City, OK 73111, (405)427-6581.
Associated Milk Producers, Consumer Services, 6240 E. 15th St., Tulsa, OK 74112, (918)835-6933.
California Milk Advisory Board, Communications Services, P.O. Box 4680, Modesto, CA 90007 (free dairy lesson plans and posters for grades K-3).
National Dairy Council, 6300 N. River Road, Rosemont, IL 60018, 1-800-426-8271.

D. Evaluation

Were the students able to see ice cream as matter changing from a liquid to a solid?

E. Related Activities

1. Invite a dietition to the classroom to explain why our bodies need a certain amount of salt. Bring in different types of salt, and have students discuss why there are different types. If students are willing, allow them to taste a small amount of each type. Students will need to sip some water between taste tests. Ask students to discover where salts come from.
2. Perform the experiment again, but have one group substitute cream for milk, one group substitute skim milk, one group substitute buttermilk and another group substitute powdered milk. Have one member in each group time how long it takes for the ice cream to reach a firm texture. Have the entire class taste the results and decide which recipe produced the tastiest ice cream and which the least tasty.
3. Have students time how long it takes salt to melt an ice cube. Use one ice cube for one tablespoon of salt. Alter the experiment by adding more salt or more ice cubes. Discuss why salt is spread on roads and walkways during bad weather. *Do workers use regular table salt or a special type of salt?*

BRANCHING INTO SPRING

SUBJECT: Science GRADE: 3

AGRICULTURAL TOPIC: Horticulture CONCEPT: I

STUDENT SKILL
Students will predict what might happen in a given scientific problem in the proper order.

LEARNER OBJECTIVE
Students will collect branches from flowering bushes and trees, force them and observe budding and flowering.

LESSON

A. Step-by-Step Instructions

1. Bring in samples of branches from spring-budding bushes or trees (forsythia, redbud, plum, pear, apple, weeping willow, pussy willow, flowering quince). Snips of trees with small flowers are often the easiest to force. If you do not have access to a garden or are unsure of what to bring into the classroom, ask friends and neighbors who are pruning their trees and bushes for contributions, or buy prunings from your local nursery. Your county Extension agent might also be able to help.
2. Place the branches in a deep container of water, and allow your students to examine them. Then take a walk on the school grounds and point out similar bushes or trees so students can identify them. Ask your students to bring similar branches from home. Students should ask for permission from a parent and get help using shears or a sharp knife to cut the branches.
3. Bring several large, wide-mouthed containers to class (quart jars, three-pound coffee cans or similar). You will need three containers for each kind of branch. Label containers "A," "B" or "C" and the name of the plant (for example, "forsythia A," forsythia B," "forsythia C," or "apple A," "apple B," or "apple C.")
4. Help students treat the ends of the branches in one of three different ways.
   A. Bruise the cut end by laying the branch on a desk and smashing the cut end with a shoe or some other blunt instrument.
   B. Cut the cut end at a slant with a sharp knife.
   C. Cut the cut end straight, then cut a cross on the end, from the bottom.
5. Fill each container two-thirds full with tepid water, and place branches in appropriate containers away from direct sunlight or heat. Have students mist the branches every day with a spray bottle and keep the water level in the containers high and clean.
6. Have students observe the branches over several days, and record their observations on the "Observation Calendar" page in the back of the book. Have them predict which branches will bloom first.

B. Background

Getting plants to bloom at a time of year when they usually wouldn't is called "forcing." This is a good way to hurry spring along during February and March, when winter seems to drag on forever. There are many trees and bushes common to Oklahoma that can be brought indoors for forcing.

Plum branches are usually easy to find. They grow thick and wild, and their branches have a purple cast that is easy to see against the brown countryside.

Other Oklahoma trees and bushes that can be forced indoors are pear trees, apple trees, forsythia bushes, dogwood trees, crab apple trees, wisteria vines, weeping willows, pussy willows, persimmon bushes and the Oklahoma State tree -- the redbud.

Branches that can be forced come from deciduous trees and bushes. Deciduous plants are woody plants. Most of them are barren in winter. That means they drop their leaves when the days start to get shorter and when it gets cold enough for frost to form.

Most of these plants are grown mainly for their flowers. They grow their flower buds in the fall but don't flower until the following spring. Very few deciduous shrubs and vines flower in the fall.

Trees and bushes are important to the environment. Trees help our environment by changing carbon dioxide into oxygen. This help clear the air and, at the same time, gives us oxygen to breathe. Trees and shrubs planted close to houses and other buildings will help keep the buildings cool in summer and warm in winter. That helps save natural resources and saves money on heating and air conditioning bills, too.

Source: Oklahoma Cooperative Extension Service,
Horticulture and Landscape Architecture, OSU

C. Resources

Books

Althea, *Trees and Leaves,* Troll, 1990.
Fleischman, Paul, *Birthday Tree,* Harper and Collins, 1979.
Hirschi, Ron, *Forest,* Bantam, 1991.
Robbins, Ken, *A Flower Grows,* Dial, 1990.

Additional Resources

Breck's Bulbs, Dept. 6523, North Galena Road, Peoria, IL 61632 (gardening tips and ideas).

D. Evaluation

Were students able to observe the different stages of the flowering branches?

E. Related Activities

1. Have students use their flowering branches to make one or more flower arrangements to display in the school office and other locations around the school.
2. Have students repeat the experiment, using the variables listed below:
   a. Change the water each day, using very cold water on one group, very warm (tap) water on one group and tepid water on one group.
   b. Put a 100-watt light bulb on one group; cover one group so that it has no light source; and leave one in regular room light.
   c. Place one group in diluted clear carbonated pop, one in diluted coffee and one in distilled water.

Have students predict what will happen in each experiment as a class and discuss observations every two or three days, until the branches start to grow leaves.

3. Provide gardening books or literature from your county Extension office, and have students research when the branches they are working with would normally bloom.

CHEW IT TWICE

SUBJECT: Science **GRADE:** 3-4

AGRICULTURAL TOPIC: Beef/Dairy **CONCEPT:** V

STUDENT SKILL
The student will complete or create an appropriate graph or chart from collected data.

LEARNER OBJECTIVE
The student will be able to trace the path a cow's food follows through its body.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets.
2. Have students trace the path of the cow's food *with their fingers* as you share the background materials.
3. Read the directions from the student worksheet to your students before allowing them to complete the color work.

B. Background

Have you ever noticed, whenever you see a cow, it always seems to be chewing something? That is because the cow has to chew its food twice. What you are watching is the cow "chewing its cud."

Bovine animals, both cows and bulls, are unique, because they have four parts to their stomachs. (Human stomachs have only one part.) After the cow takes a bite of grass or hay, the first place the food moves is to the rumen (roo' mihn). Here the food is partly digested by tiny bacteria that live in the rumen. The food is then passed to the reticulum (ruh tik' yu lum), which is a membrane with "honeycombed" ridges. These ridges break the food down into smaller pieces. Then the cow regurgitates those pieces so it can chew them again.

The partly-digested food that comes back into the cow's mouth is called cud.

The cow rechews the food with its powerful back teeth to break it down even more. This is what the cow is doing when it "chews its cud."

As the cow swallows, and saliva washes the cud back into the cow's system, the food now flows into the omasum (oh mah' sum), the third section of the stomach. During this process the food breaks down into vitamins and nutrients that the cow's body absorbs to meet its daily nutritional needs.

The fourth division of a cow's stomach is the abomasum (a bo mah' sum). The final digestive process takes place here. In the abomasum the cow's system gets all the remaining food value it needs from the food before letting it pass to the intestines.

The intestines store the unused food portions and continue to absorb some nutrients from them until there is enough to push out the back side of the cow as waste material, or cow manure.

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

Archambault, John, and Bill Martin, Jr., *Barn Dance*, Holt, 1986.
Cole, Joanna, *The Magic School Bus Inside the Human Body*, Scholastic, 1989.

Gibbons, Gail, *The Milk Makers*, Macmillan, 1985.
Grossman, Bill, *Donna O'Neeshuck Was Chased by Some Cows*, Harper Collins, 1988.
Shaw, Charles, *It Looked Like Spilt Milk to Me*, Harper Collins, 1947.

Additional Resources

"Our Friend Herfy," Nebraska Hereford Auxiliary, c/o Meneda Phifer, Rt. 1, Mason City, NE 63355 (32-page storybook, $4, plus 90 cents for postage and handling.)
"Farm Animals, Close Up and Very Personal," Stage Fright Productions, P.O. Box 373, Geneva, IL 60134 (VHS tape, $16.95).

D. Evaluation

Did the students color the food's path correctly, and did they use the correct colors?

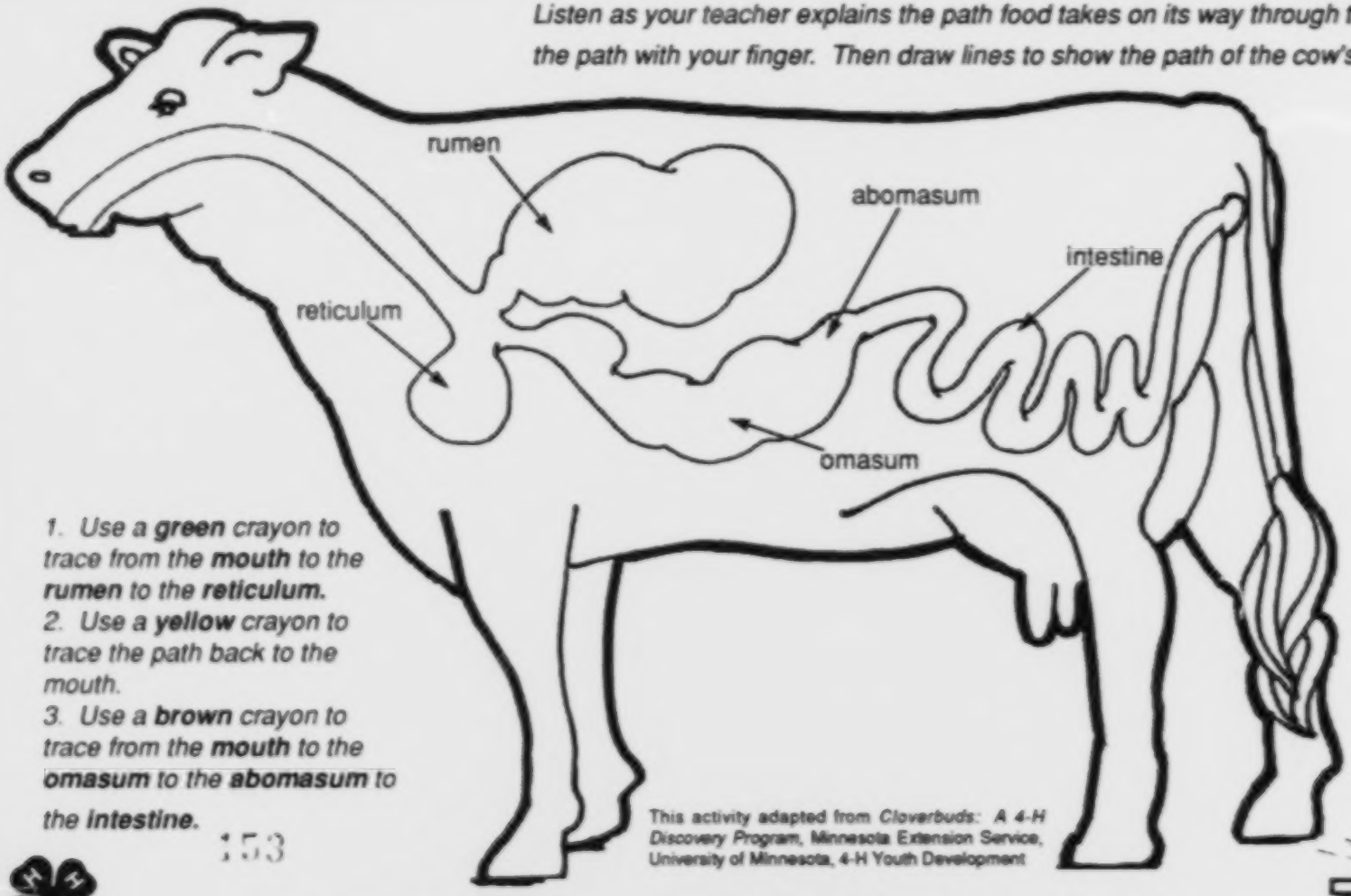
E. Related Activities

1. Invite a veterinarian to class to explain the types of vegetation a cow eats. Ask the veterinarian to bring a cow skull, if possible, so students can see what kind of teeth and jaw a cow has.
2. Invite a dietitian to the classroom to discuss what kinds of food are best for developing bodies and the importance of chewing food before it enters the digestive tract.
3. Invite a dentist to class to talk about the importance of keeping teeth clean.

Name _____

Chew It Twice

Listen as your teacher explains the path food takes on its way through the cow. Follow the path with your finger. Then draw lines to show the path of the cow's food.



1. *Use a **green** crayon to trace from the **mouth** to the **rumen** to the **reticulum.***
2. *Use a **yellow** crayon to trace the path back to the mouth.*
3. *Use a **brown** crayon to trace from the **mouth** to the **omasum** to the **abomasum** to the **intestine.***

153

This activity adapted from *Cloverbuds: A 4-H Discovery Program*, Minnesota Extension Service, University of Minnesota, 4-H Youth Development

154

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Ag in the Classroom

LET IT RAIN

SUBJECT: Science **GRADE:** 3

AGRICULTURAL TOPIC: Soil **CONCEPT:** IV

STUDENT SKILL
Students will follow steps of a scientific problem in the proper order.

LEARNER OBJECTIVE
The student will observe the effects of water erosion on soil.

LESSON

A. Step-by-Step Instructions

1. Divide the class into two groups, and provide each group with 12 cups of soil in an eight- or 10-inch pan and one pint of water in a sprinkler can.
2. Have the first group construct a hill that slopes gently from one end of the pan to the other.
3. Provide the second group with an assortment of natural materials (grass clippings, sticks, dried or green leaves). Instruct the second group to mix the natural materials with the soil in its pan, and construct a sloping hill similar to that constructed by the first group.
4. Ask students to predict what will happen when the first group sprinkles water on its hill. Accept all reasonable predictions.
5. Prop up the hill end of Group One's pan with a text book. Have one student from Group One sprinkle the water from 12 inches above the sloping hill. Discuss the results.
6. Have students predict what effect the water will have on the second group's hill. Prop up the Group Two pan with the same text book, and have one student from Group Two sprinkle water from the same height. Discuss the results.
7. Provide each group with a basting syringe to retrieve the run-off water. Have each group measure the remaining liquid in a marked glass beaker or measuring cup. The groups should compare their results and formulate a hypothesis, as a class. A few hours later, have students observe the runoff water again to see what happened to the soil caught in the runoff.
8. Share the background information, and have students develop a class definition for the term "erosion."

B. Background

*Soil **erosion** is what happens when soil is washed or blown away. The slope of the land, the climate and the texture of the soil all play a part. In places where the land is covered with plants such as grass or trees, erosion takes place so gradually that new soil is formed before erosion has time to occur. That is not the case in places where the soil has little or no plant cover.*

The Grand Canyon is a very familiar example of erosion by water. Most of the erosion there was the work of nature rather than man. In that part of the country the hot, dry climate makes it difficult for plants to grow. The soil is sandy. Sand particles don't stick together very well, so they wash away easily. The land around the Grand Canyon slopes into the Colorado River, and that also makes erosion more likely.

Heavy rains cause soils to erode away in many parts of Oklahoma where the land slopes, and the soil is unprotected. One of the best examples of wind erosion in Oklahoma is the Little Sahara State Park in Major County. Windy conditions, sandy soils and sparse vegetation are the cause of the erosion there.

Keeping healthy soil is very important to farmers. For that reason, careful

farmers do their best to protect their soil. The best way for farmers to do this is to keep their fields covered with vegetation at all times. Plant cover provides a cushion against the beating force of the rain and also slows the wind at the soil's surface.

Some farmers protect their soil by leaving ***stubble*** *or* ***residue*** *in their fields after they have harvested their crops. Other farmers plant their fields with grass or cover crops during seasons when they are not growing their main crop. Bermudagrass provides the best cover but is difficult to use if the farmer plants row crops. Other cover crops, like alfalfa, clover and field peas, send roots deep into the soil and help hold it in place. Those crops also fix nitrogen from the air and make it available to the soil.*

When it is time to plant, the farmer will turn the stubble or cover crops under to add extra organic matter to the soil. The organic matter, in turn, helps the soil hold together and soak up moisture rather than wash away.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Bourgeois, Paulette, *The Amazing Dirt Book,* Addison-Wesley, 1990.
Cole, Joanna, *The Magic Schoolbus Inside the Earth,* Scholastic, 1987.
Gwynne, Fred, *King Who Rained,* Prentice-Hall, 1987.
Lambert, David, *Weather,* Watts, 1983.

Additional Resources

"Dirt Cookbook," Miami Soil and Water Conservation District, 1330 N. County Road, 25A, Troy, OH 45373, (513)335-7666 ($6, plus $2 for shipping and handling).

"Sammy Soil Saver," NACD, P.O. Box 855, League City, TX, 77574-9989, K-3 (puppet kit with script, $49.95).

Riverside-Corona Resource Conservation District, 2023 Chicago Avenue, B-14, Riverside, CA, 92507-2305 (eight-page activity packet, with hands-on projects about soil. Minimal charge to teachers outside the district.)

D. Evaluation

Do students understand the effects of erosion on soil, and can they identify cases of erosion in the land around them?

E. Related Activities

1. Have students pair up to look for the effects of erosion on the school yard. Give students ample time to scout their surroundings, then have them return to the classroom and share their findings. Have students make suggestions about stopping or slowing the erosion.
2. Take pictures of erosion that is occurring on the school ground or in the community, and let students make a collage. Have students write captions describing what is happening in each picture, or have them write solutions to each erosion problem.
3. Conduct the experiments again, using a variety of natural materials -- green leaves, grass clippings, fresh or dried pencil shavings, peanut shells, straw, popcorn. Have students decide which works best to slow down erosion.
4. Invite a local soil conservation district representative to your classroom to discuss erosion control in your community.

WORM WATCHING

SUBJECT: Science **GRADE:** 3

AGRICULTURAL TOPIC: Soils **CONCEPT:** IV

STUDENT SKILL

Students will make descriptive (qualitative) or numerical (quantitative) observations in a given set of objects, organisms or events.

LEARNER OBJECTIVE

The student will learn how earthworms help build good soil.

LESSON

A. Step-by-Step Instructions

1. Bring a gallon-size glass jar to class, and fill it loosely with soil, leaving about two inches at the top. Bring several earthworms to class, or ask students to bring them.
2. Share background material, and allow students to examine the worms carefully to find the ringlike segments and swollen band at the front of the earthworm's body.
3. Release all but six of the earthworms in the dirt outside. Place the remaining six in the jar, and cover them with lettuce and grass clippings or decaying leaves. Wrap the jar with black paper, and tape it in place.
4. Leave the jar in a cool, dark place, and do not touch it for at least a week. Have students take turns dampening the soil every day and adding more food as the lettuce and other materials disappear. Do not otherwise touch the jar for at least a week.
5. Have students draw pictures of the earthworms and use the "Observation Calendar" chart at the back of the book to predict what will happen in the jar.
6. After 10 days, unwrap the jar, and have students observe what the worms have been doing. Have them draw pictures of the tunnels the worms have dug on their charts.
7. Take the jar outside on a warm day, and carefully dump the contents onto a flower garden or some other spot where the worms can work their way back into the earth. Have students use sticks to gently probe the dirt and look for signs of the food they have placed in the jar over the past 10 days.

B. Background

Earthworms are very important to the farmer. They help improve the topsoil and make it more fertile. The tunnels earthworms make in the soil can be as much as six feet long. The tunnels help air and water to get into the soil. Earthworms actually eat the soil. They ***digest*** *the parts of the soil their bodies need and* ***excrete*** *what they don't need. The parts they excrete, the* ***castings****, are much richer in minerals after they have been through the worm's digestive system. The average earthworm will produce its weight in castings every 24 hours. One earthworm can digest several tons of soil in one year.*

Earthworms are found everywhere on the earth's surface, except at the north and south poles, where it is very cold. They can be so tiny you can't see them without a microscope, or they can be several feet long. They are called by several names -- "orchard worm," "rain worm," "angleworm," "red wigglers," "night crawler" and "field worm."

The earthworm has no head, no eyes, no teeth and no antennae. Its body is made up of many ringlike segments. There is a swollen band, lighter in color than the rest of the body, at the front of the earthworm's body.

Earthworms have both male and female reproductive organs. They lay egg capsules that must be fertilized by another worm. Each egg capsule contains several baby worms, called ***wormlets.*** *The wormlets come out of the capsules three to four weeks after the worm deposits the capsule near the soil surface. When they first appear they look like tiny threads, about one-sixteenth of an inch in length.*

You can usually find earthworms near the surface of the soil after it rains. They will die if they dry out and don't like strong light. Earthworms are very sensitive to chemicals. Some people raise earthworms to sell as fish bait or to help enrich poor soil.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Jennings, Terry, *Earthworms, Junior Science*, Watts, 1990.
Kalman, Bobbie, *Buried in Garbage*, Crabtree, 1991.
McLaughlin, Molly, *Earthworms, Dirt and Rotten Leaves*, Avon, 1990.
Robinson, Barbara, *My Brother Louis Measures Worms*, Harper Collins, 1988.
Rockwell, Thomas, *How to Eat Fried Worms*, Watts, 1973.

Additional Resources

Soil Conservation Service, USDA, P.O. Box 2890, Washington, DC 20013.
Young Naturalist Company, 614 E. 5th St., Newton, KS 67114, (316)283-4103 (nature education kits, including teacher's guide activities, specimens, ranging in price from $19.95 to $24.95).

D. Evaluation

Were students able to see the tunnels the worms had made in the soil? Do students understand how the worms turned the lettuce and other organic materials into soil?

E. Related Activities

1. Set up another jar and feed the worms different kinds of organic materials (shredded paper, bread crumbs, thin apple slices, grated orange peel). Earthworm breeders use a mixture of cornmeal and coffee grounds. Have students keep records of how fast each item disappeared and make simple bar graphs to demonstrate their data.
2. Have students brainstorm about how the earthworm got each of its different names (see background materials) then have each student choose one of the names and write a story about it.
3. If your class has started a compost pile, wait until it has had time to start decomposing well, then have an earthworm hunt. Students may use sticks, large spoons or garden trowels to dig gently through the compost. Have them look especially for wormlets.

SAVE OUR SOIL

SUBJECT: Science **GRADE:** 3-4

AGRICULTURAL TOPIC: Soils **CONCEPT:** IV

STUDENT SKILL

Students will complete or create an appropriate graph or chart from collected data.

LEARNER OBJECTIVE

Students will view a demonstration which will help them understand what a small amount of soil is used to sustain humans on the earth.

LESSON

A. Step-by-Step Instructions

1. Bring a large apple and a paring knife to class. Share background materials, then explain to your students that the apple represents the world.
2. Cut the apple into four equal parts. Tell students that three parts represent the oceans of the world, and the fourth part represents the land area.
3. Cut the land section in half, lengthwise. Now you have two one-eighth pieces. Explain that one section represents land which can't be used for producing food -- deserts, swamps, mountains and the Arctic and Antarctic regions. The other one-eighth section represents land where man can live.
4. Slice this one-eighth section lengthwise into four equal parts. Now you have four one-thirty-second sections. The first section represents the areas of the world which have rocky soil that is too poor for any type of food production. The next section represents land too wet for food production. The third section represents areas that are too hot for food production. The last section represents the area of the world developed by man.
5. Carefully peel the last one-thirty-second section. This small bit of peeling represents all the soil of our earth on which humans depends for food production.
6. Lead a class discussion in which you ask the following questions:
   What would happen if the sliver of topsoil we use for food production should suddenly wash into the ocean or become polluted by chemical warfare?
   What will happen if the world's population continues to grow larger, while the amount of topsoil continues to grow smaller?
   What can you and your family do to help conserve precious soil in your own backyard? (composting food scraps and yard waste to help build soil, insisting that local officials make responsible decisions about urban development, growing some of their own food, encouraging parents to carpool or support mass transit systems to cut down on the need for parking lots, urging farmers to practice good soil conservation, etc.) What about you and your classmates on your school grounds?

B. Background

All living things depend on soil to live. If we had no soil we would have nothing to eat. Soil that can be used for growing food is called **arable** *land. Every year we lose thousands of acres of arable land. In Oklahoma alone, we lost over 80,000 acres between 1978 and 1987.*

Some of the land is lost because we need more houses for people to live in. Quite a bit of land gets paved over every year for parking lots and shopping malls. Some is poisoned by industrial waste and other pollutants. Some of the land blows

or washes away, and some of it just gets used up, because it has been producing food year after year for many years.

The world's population is expected to double in the next 40 years. Since we are getting more and more people at the same time we are losing more and more arable land, each person's portion of food is getting smaller and smaller. It may not seem to you that your portion is getting smaller, but if you pay attention to what is happening in countries around the world, you will see that many people don't get enough to eat. It is very important that we take good care of the soil we have left so that we and all the other people in the world don't go hungry.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Bourgeois, Paulette, *The Amazing Dirt Book,* Wesley-Addison, 1990.
Cobb, Vicki, *Lots of Rot,* Harper Collins, 1981.
Delton, Judy, *Peewee Scouts #16, Trash Bash,* Dell, 1992.
Seuss, Dr., *The Lorax,* Random House, 1971.
Stille, Darlene R., *Soil Erosion and Pollution, A New True Book,* Children's Press, 1990.

Additional Resources

Oklahoma Conservation Commission, 2800 N. Lincoln Blvd., Oklahoma City, OK 73105.
Riverside-Corona Resource Conservation District, 2023 Chicago Ave., B-14, Riverside, CA 92507-2305 (eight-page activity packet, with hands-on soil projects. Minimal charge to teachers outside the district.)
Soil Conservation Service, USDA P.O. Box 2890, Washington, DC 20013.
"Soil Erosion by Wind," Soil Conservation Service, 1345 Main St., Red Bluff, CA 96080 (free booklet explaining soil erosion by water and what to do about it).
"Teaching Soil and Water Conservation: A Classroom and Field Guide," Soil Conservation Service, 1345 Main St., Red Bluff, CA 96080 (22 free hands-on lessons that teach the concepts of soil erosion and the importance of conservation).

D. Evaluation

Did the demonstration help students understand the importance of soil conservation? Did students participate in the discussion and come up with suggestions for soil conservation?

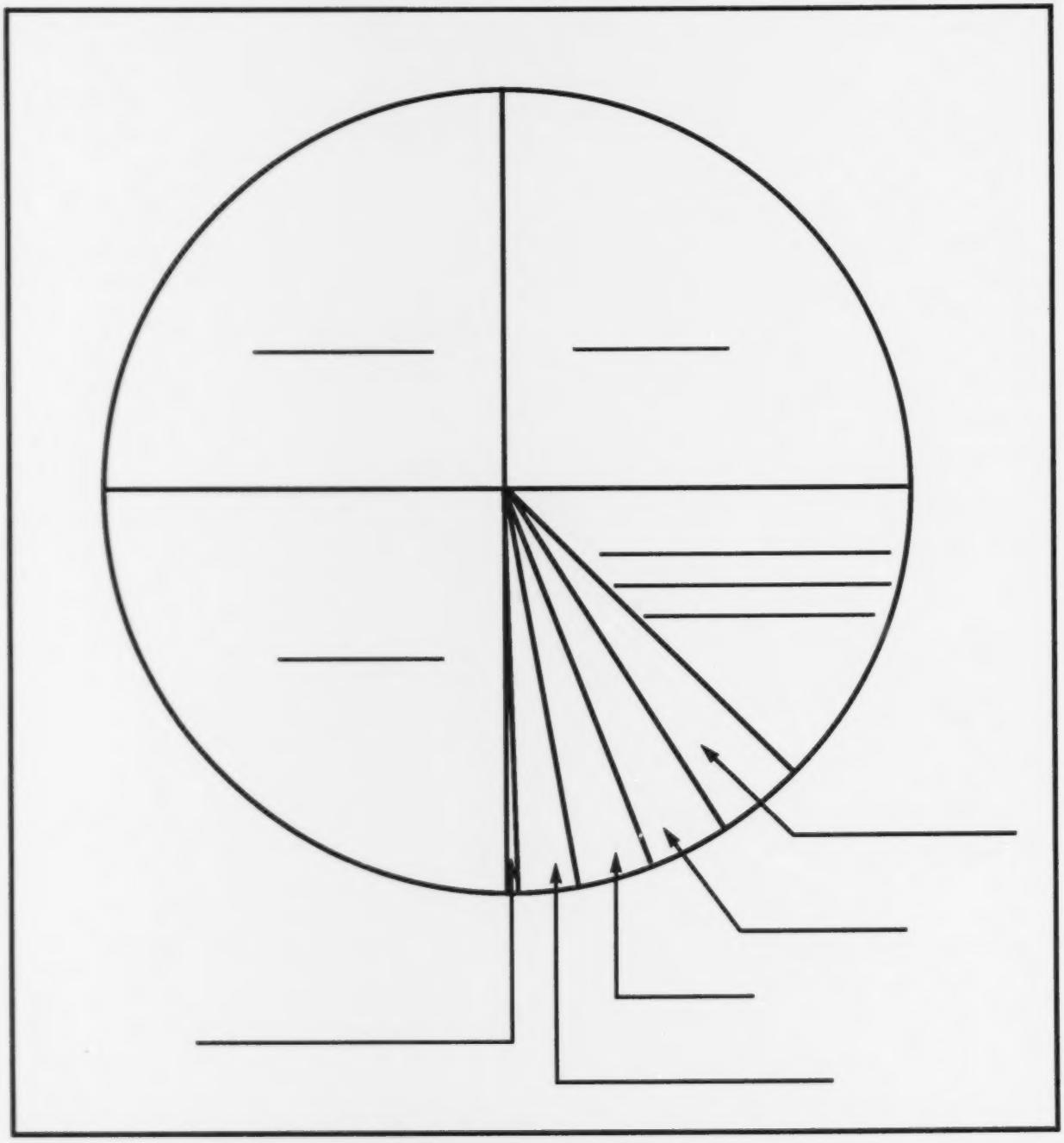
E. Related Activities

1. Invite a local soil conservationist into your classroom to discuss what special things are being done to save the soil.
2. Start a school compost pile to help revitalize the soil around the school. When the compost is "done," spread it out on ground that has been trampled, or mix it into a flower bed.
3. On a world map have students locate some of the countries they have heard about where people don't have enough to eat (third world countries like Somalia, Ethiopia, some eastern European countries and even some parts of the United States). Have them research the countries and find out the reasons for the food shortages (climate, politics, shortage of arable land, lack of money, etc.)

Name _____

Save Our Soil

Label the segments of the graph, using the information your teacher reads to you. When you have finished, color the graph, using a different color for each segment.



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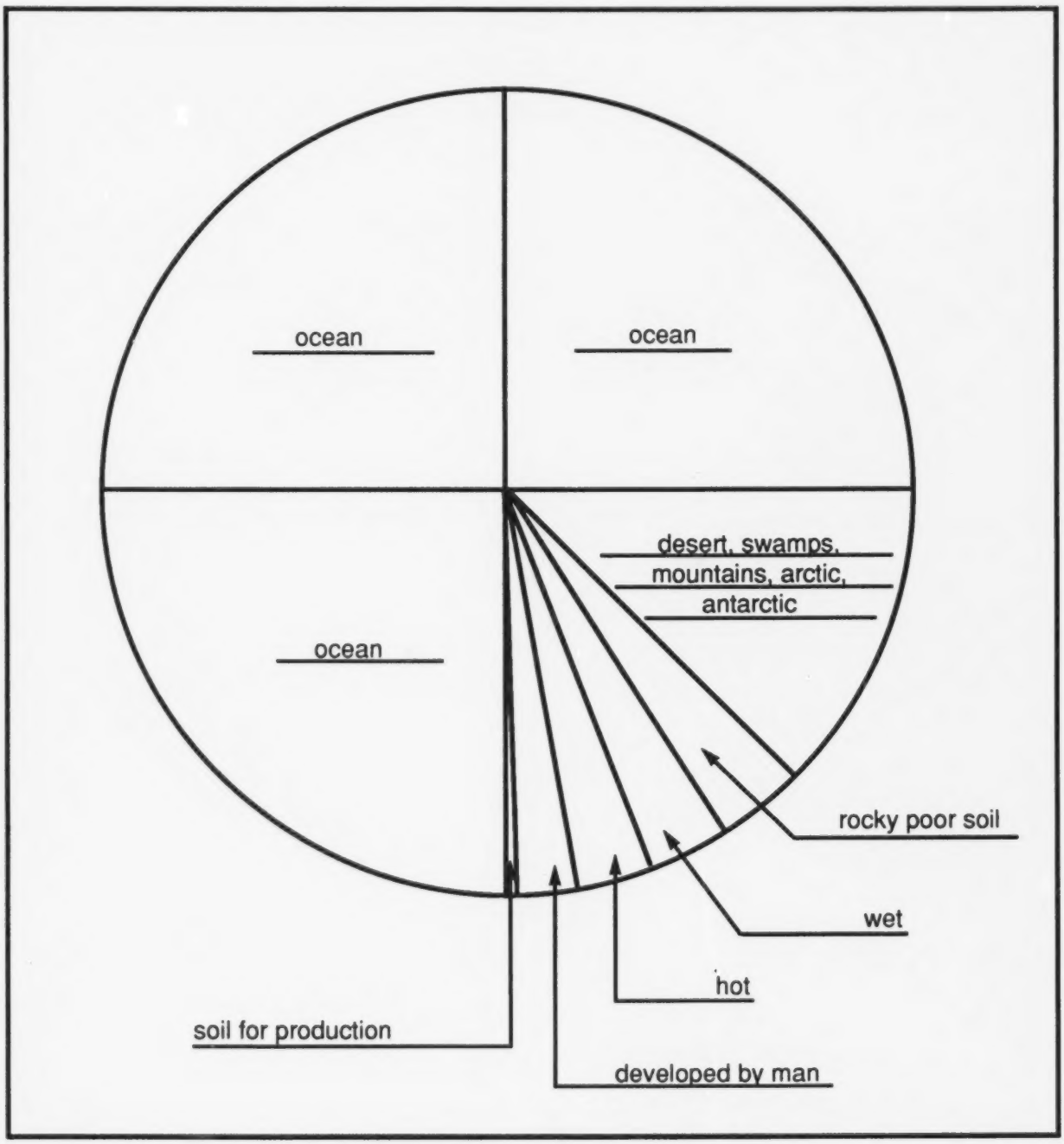
Name _____

Save Our Soil (Answer Key)

Label the segments of the graph, using the information your teacher reads to you. When you have finished, color the graph, using a different color for each segment.



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SOAK IT UP

SUBJECT: Science GRADE: 4

AGRICULTURAL TOPIC: Soils CONCEPT: IV

STUDENT SKILL
Students will select appropriate predictions for given patterns of evidence.

LEARNER OBJECTIVE
The student will learn how organic matter increases the amount of water soil will hold.

LESSON

A. Step-by-Step Instructions

1. Ask students to bring clean, plastic pop bottles to class. Help students cut the top one-half of the bottles off to serve as funnels. Place the tops of the bottles upside down in the bottom parts of the bottles.
2. Divide students into groups of four or five, and provide each group with cheesecloth, paper towels or coffee filters and equal portions of dry sand and dry garden or potting soil. If possible, bring clay soil to class also.
3. Share background materials, and have students inspect the different kinds of soil by looking, feeling and smelling them. Have students record their observation.
4. Have each group line two funnels with the cloth or towels and place sand in one and clay or garden soil in the other.
5. Students should measure one cup of water and slowly pour it into the funnel holding the sand. Then have them measure the water in the bottom half of the pop bottle and figure out how much water stayed in the sand and how much ran through. Have students repeat the experiment with the other funnel.
6. Have students mix peat half and half with another portion of dry sand and repeat the experiment. Add other organic materials to the mixture (decomposed leaves, grass clippings, finely shredded paper) and repeat the experiment. Discuss the results.

B. Background

*Sand, silt and clay are inorganic materials. They are formed over hundreds of years from rocks breaking down. **Sand** is made up of larger particles which can be seen with the naked eye. It has a coarse feel and allows water to move through very quickly. **Silt** particles are too small to see with the naked eye. They have a smooth feel, like flour or powder, when you rub them between your fingers. Silt is often found in places that have flooded and dried out again. **Clay** is made up of very tiny particles. It is sticky when wet and can be rolled into a ball. The particles fit together so closely that it is difficult for water to flow through.*

*The best kind of soil for plants allows water to move through slowly enough so that some of it stays in the soil for the plants to use. Water moves too quickly through sand. It moves very slowly through clay, but clay holds the water so tightly that plants can't get to it. Soil that is good for plants has a mixture of sand, silt, clay and organic material, or **humus**. Humus acts like a sponge to help the soil capture water. Humus is formed when plants and animals die. Soil that has about equal amounts of sand, silt, clay and humus is called **loam**.*

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Bourgeois, Paulette, *The Amazing Dirt Book*, Addison-Wesley, 1990.
Cole, Joanna, *The Magic Schoolbus Inside the Earth*, Scholastic, 1987.
McLaughlin, Molly, *Earthworms, Dirt and Rotten Leaves*, Avon, 1990.
Myers, Anna, *Red-Dirt Jessie*, Walker and Co., 1992.
Stille, Darlene, *Soil Erosion and Pollution*, A New True Book, Children's Press, 1990.
Wallace, Bill, *Danger in Quicksand Swamp*, Minstrel, 1991.
Wyler, Rose, *Science Fun With Mud and Dirt*, Simon and Schuster, 1990.

Additional Resources

Gopher Crops & Soils Club, Attn: Vernon Cardwell, Dept. of Agronomy, University of Minnesota, 1991 Buford Circle, St. Paul, MN 55108. (Write for information about samples of crop seeds, weed seeds, crop plants and soils.)

Riverside-Corona Resource Conservation District, 2023 Chicago Ave., B-14, Riverside, CA 92507-2305 (eight-page activity packet, with hands-on projects about soil. Minimal charge to teachers outside the district.)

Soil Conservation Society of America, 7515 NE Ankeny Rd., Ankeny, IA 50021-9764 (25 cents, 15 cents for teacher's guide).

Stiegler, James, and Charles Cox, "Ag in the Classroom Soil and Water Conservation Teacher's Supplement;" Oklahoma State University, 4-H and Youth Development, 205 Poultry, Stillwater, OK 74078, (405) 744-8887 (free).

"Teaching Soil and Water Conservation: A Classroom Field Guide," Soil Conservation Service, USDA, P.O. Box 2890, Washington, DC

D. Evaluation

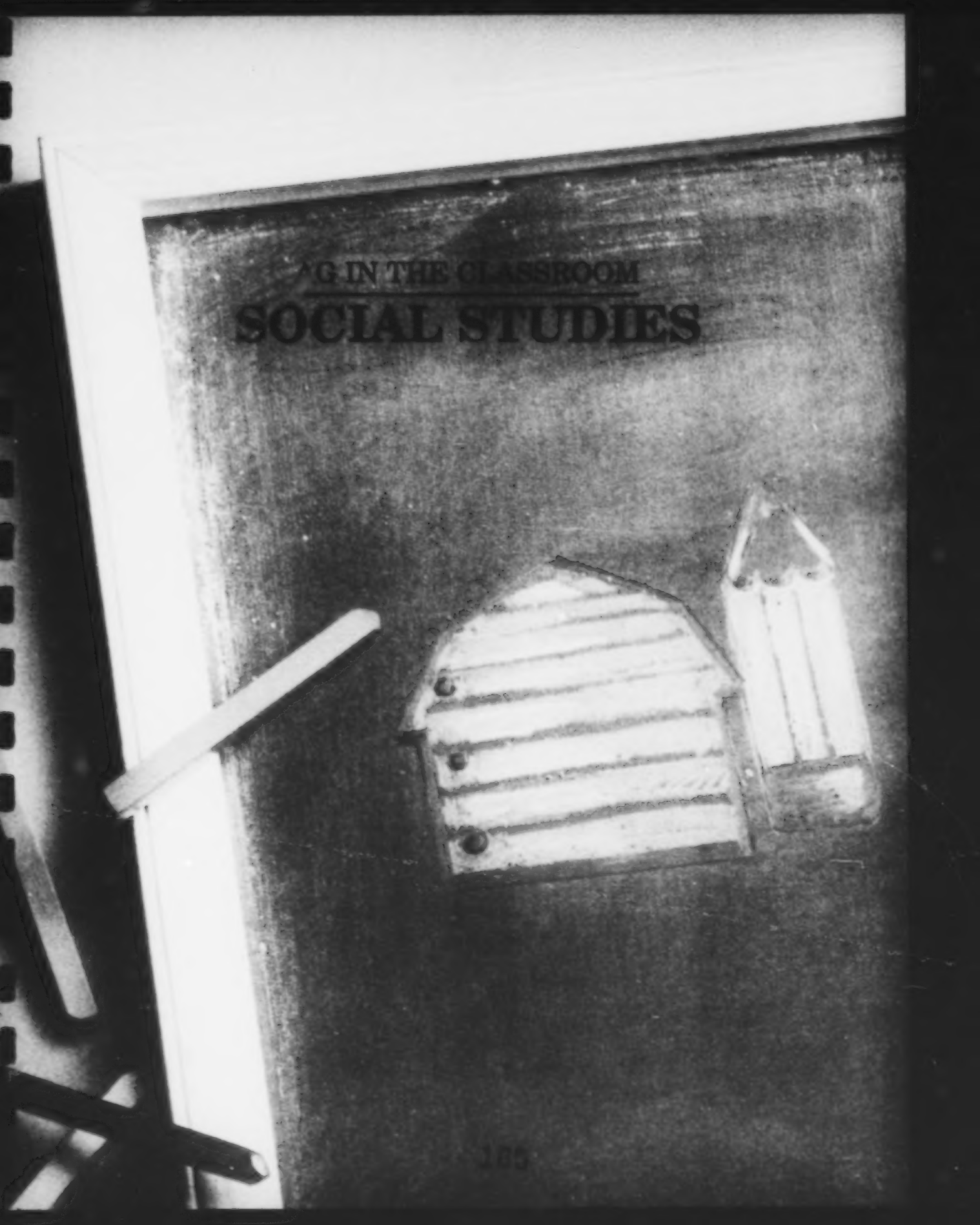
Were students able to see the difference in the sand and the clay after organic matter had been added to it?

E. Related Activities

1. Enlist the help of parents or your county Extension agent in gathering soil that is mostly sand, soil that is mostly silt and soil that is mostly clay. Have students examine the different kinds of soils through a magnifying glass and compare the particle size in each.

2. Divide students into groups, and provide each group with a quart jar, water, garden soil and nonsudsing detergent (dishwasher detergent). Have students pour water into quart jars until they are two-thirds full and add one cup of finely crushed garden soil and three tablespoons of detergent. Students should cover the jars tightly and take turns shaking hard, at intervals, for at least five to ten minutes, or until the soil particles are broken apart. Place the jars where they will not be disturbed for 24 hours. The coarse soil particles will settle rapidly. (You may need to add some sand to silt or silty clay loams if all the particles are small.) After 24 hours have students hold white paper next to the jars and carefully mark the thickness of each layer of coarse material "sand," the middle layer "silt" and the top material "clay."

3. Have students use the different kinds of soil from their experiments to sprout bean plants or some other sturdy seedlings. Cut clean cardboard milk cartons in half, and have students fill them with different kinds of soil. Have students determine if the soil is mostly sand, mostly silt, mostly clay, or a good mix. Then have them label the containers. Students may also add organic materials to soils that lacks humus. Instruct students to give their plants equal amounts of water and sunshine and chart their growth.


G IN THE CLASSROOM
SOCIAL STUDIES

FIND YOUR WAY ON THE FARM

SUBJECT: Social Studies **GRADE:** 3

AGRICULTURAL TOPIC: Rural Life **CONCEPT:** III

STUDENT SKILL

The student will interpret various pictorial sources of information, such as maps, graphs, charts, globes, pictures and cartoons.

LEARNER OBJECTIVE

The student will practice map skills by using a map grid to locate things that can be found on an Oklahoma farm.

LESSON

A. Step-by-Step Instructions

1. Review with students the way to use a grid to locate objects or places on a map.
2. Hand out student worksheets, and discuss the directions.

B. Background

How would you find your new friend's house if he or she lived in a town? Towns are laid out with street names, and all of the houses and buildings have numbers. But what if your friend lived in the country?

Without street names, how do you think a farmer would tell his helper where to find his stalled tractor or where her lost calf was last seen? Sometimes the farmer will give directions by miles: "Go two miles north on Old Farm Road, then back one mile on Garden Lane." Sometimes he or she will use landmarks: "Turn left at the red barn."

Farm land is divided on maps by ***acres****. The acres are grouped in* ***sections****. An acre is about the size of a football field. There are 640 acres in a section.*

Source: Oklahoma Cooperative Extension Service, Biosystems and Agricultural Engineering, OSU

C. Resources

Books

Anderson, Joan, and George Ancona, *The American Family Farm,* Harcourt, Brace, Jovanovich, 1989.
Bunting, Eve, *The Big Red Barn,* Harcourt, Brace, Jovanovich, 1979.
Collins, David R., *Pioneer Plowmaker: A Story About John Deere,* Carolrhoda, 1990.
Emberley, Ed, *Ed Emberley's Drawing Book, Make a World,* Little, 1972.
Gammell, Stephen, *Once Upon MacDonald's Farm,* Macmillan, 1984.
Locker, Thomas, *Family Farm,* Dial, 1988.

Additional Resources

"Slice," National Farm-City Council, 225 Touhy Ave., Park Ridge, IL 60068 (lessons for primary and intermediate school students, introducing farm life to city kids, $3).

D. Evaluation

Answers for the student worksheet are as follows: 1. a. Market Street and 1st Street; b. Crop Avenue and 3rd Street; c. Pear Tree Lane and 4th Street; d. Pear Tree Lane and 2nd Street; e. Market Street and 6th Street. 2.a. B,1 b. B,5 c. A,2 d. D,4 e. A,5 f. C,2 g. C,7 h. B,6.

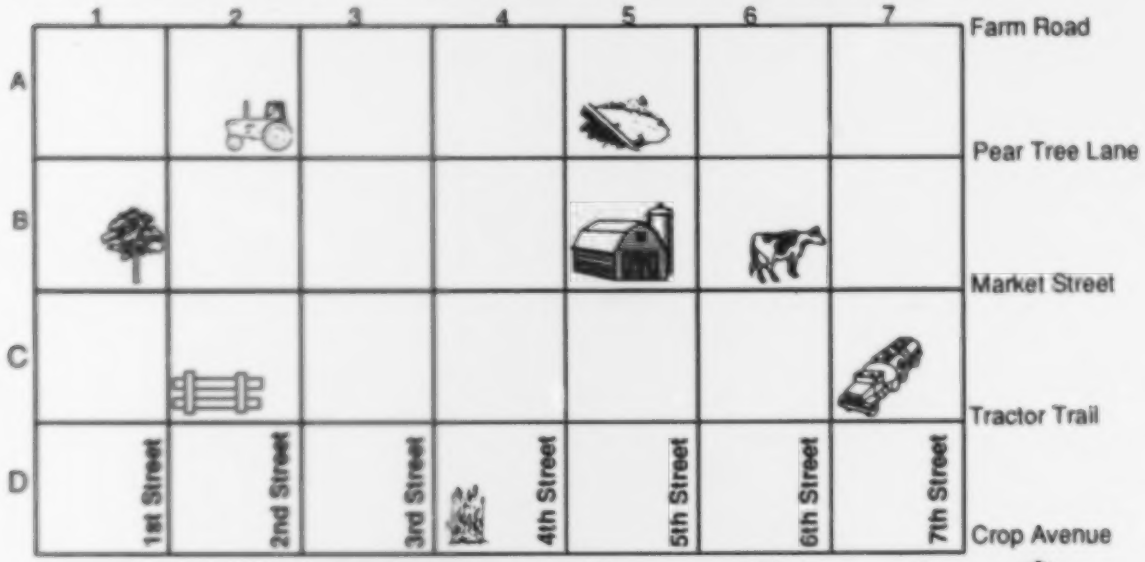
E. Related Activities

1. Draw a grid map of the classroom. Have students locate the seating assignments of all the class members.
2. Make a large class grid of a make-believe place or a place with which the class would be familiar. Have each student design an object or place to be located on the map. When all designs have been completed, make a map key.
3. Use a state road map to practice locating cities, towns or state parks. Divide students into teams. Call out the name of the place and the coordinates where it can be found. Members of the first team to find it should raise their hands. Road maps are available free, in quantity, from the Oklahoma State Department of Tourism.

Name _____

Find Your Way on the Farm

Study the map grid of the farm. Use the grid to complete the questions below.



Key: fence, tractor, cow, wheat field, milk truck, barn and silo, tree, pond

1. An intersection is the place where two streets come together. Complete the sentences below by writing the names of the two streets that make the intersections where the objects in bold print are located.

a. The **tree** is located at _____ and _____.

b. The **wheat field** is located at _____ and _____.

c. The **pond** is located at _____ and _____.

d. The **tractor** is located at _____ and _____.

e. The **cow** is located at _____ and _____.

2. Give the letter and number of the box where each item is found on the map grid.

a. tree B, 1 b. barn and silo_____ c. tractor_____ d. wheat field_____
e. pond_____ f. fence_____ g. milk truck_____ h. cow_____

3. Add a farm object to the map grid. Draw the symbol, then write its coordinates in the blank. _____

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HONEY HUNT

SUBJECT: Social Studies GRADE: 3

AGRICULTURAL TOPIC: Bees CONCEPT: I

STUDENT SKILL
The student will construct maps, charts, graphs and tables.

LEARNER OBJECTIVE
The student will learn how bees communicate with one another and explore alternative forms of communication with their classmates.

LESSON

A. Step-by-Step Instructions

1. Share background material.
2. Divide your class into groups of four or five, and provide one packet of honey or "Bit-o-Honey" candy bar to represent nectar for each group.
3. Have each group hide its nectar and draw a map showing another group how to find it. The groups should then exchange maps and have a nectar hunt.

B. Background

Honey bees are social insects. That means they depend on one another for survival. Honeybees live in groups called colonies. A colony can have tens of thousands of bees. There is only one queen in each colony. She serves as the mother of the colony, laying more than 1,800 eggs a day. She has to lay that many eggs, because worker bees only live a few weeks during honey-making season in the spring and summer.

Nearly nine out of ten honeybees are workers. All worker bees are female and have stingers. Their duties are to gather nectar and pollen, feed and raise young bees and defend the colony. The younger bees stay in the colony and do safe jobs like clean the hive, guard the entrance, care for the larvae and make wax for the honeycomb. When they get older they get to do more dangerous jobs, like foraging for nectar and scouting for new places to build hives.

Every colony has a few male honeybees, called drones. The drone has no stinger. His purpose is to fertilize the queen bee. She keeps sperm from the drones until she is ready to lay eggs. If she uses the sperm the colony gets more workers. If she doesn't use it, the colony gets more drones.

Honeybees make honey from nectar, a sweet liquid they find inside flower blossoms. They collect the nectar and carry it back to the colony in pouches within their bodies. The secret ingredient that turns nectar into honey is bee "spit." In the hive young worker bees mix the nectar with saliva. Chemicals in the bee saliva help change the nectar into sugars. The nectar/saliva mixture is then stored in the beeswax comb by the workers. The younger bees fan the nectar with their wings until much of the water has evaporated. Then they put wax caps on it and save it to eat in the winter.

Beekeepers harvest honey just like any other crop. When they take honey from a hive, they are very careful to leave enough so the bees can survive the winter.

Honeybees are very important to the farmer. Before any kind of plant can produce fruit, its flowers must be pollinated. Bees pollinate flowers as they fly from one to another, gathering nectar. Pollen is sticky and clings to the honey bee's body. When the bee flies to the next flower, the pollen will rub or fall off. In places

where there aren't enough pollinating insects, growers will sometimes bring in bees to do the job for them. If all the honeybees disappeared, about one-third of all the foods we eat today would disappear as well.

Honeybees are gentle insects. They will sting only if they are frightened or harmed. If you are stung you should remove the stinger immediately by scraping it off with a fingernail or any straight-edged instrument. Do not try to pull it out, because this will force more venom into your skin. It's true that a worker bee will die a few hours after stinging. That's because the stinger has a barb at the point which the bee cannot pull out once it is stuck in your skin.

Honeybees are the only insects that produce food eaten by humans. Honey provides energy. It is absorbed into the human system immediately and doesn't need digestive juices to break it down. It is a natural preservative, so foods made with honey stay fresh longer.

Source: Oklahoma Cooperative Extension Service, Entomology, OSU

C. Resources

Books

Heller, Ruth, *The Reason for a Flower*, Putnam, 1992.
Holly, Brian, *Hayes Book of Bugs and Critters*, Hayes, 1985.
Lord, John, and Jane Burroway, *Giant Jam Sandwich*, Houghton-Mifflin, 1972.
Ryder, Joanne, *Dancers in the Garden*, Sierra, 1992.

Additional Resources

"What's Buzzin'," National Honey Board, Attn: Mary Humann, 421 21st Ave., Ste. 203, Longmont, CO 80501-1421 (free educational kit for students in grades 4-6, includes videotape, worksheets, poster and teacher's guide).

D. Evaluation

Were students able to draw maps that led their classmates to the honey?

E. Related Activities

1. Lead a discussion on the similarities between bees and humans. *Are humans social animals? Do they depend on one another for survival?*
2. Have a tasting party. Let students taste honey mixed with peanut butter, honey mixed with margarine and honey mixed with mustard and any other mixture you can think of.
3. Invite a beekeeper to your class, and ask him or her to bring some of the equipment he uses.

BACK TO THE FARM

SUBJECT: Social Studies **GRADE:** 4

AGRICULTURAL TOPIC: Geneology/Careers **CONCEPT:** III

STUDENT SKILL

The student will design and construct maps, charts, graphs, tables, and cartoons using data.

LEARNER OBJECTIVE

The student will trace his or her family history to find family members with farming or ranching backgrounds.

LESSON

A. Step-by-Step Instructions

1. Discuss the term "genealogy" with students, and explain how to develop a family tree. Lead a discussion in which you ask students "*What would be the purpose of learning your family's history?*"
2. Share background material. Brainstorm, and have students help you make a list on the chalk board of all the agriculture-related jobs they can think of.
3. Hand out student worksheets, and have students take them home and complete the family trees as completely as possible, with the help of a parent.
4. Have students draw stars next to the names of family members who live(d) and/or work(ed) on a farm or a ranch. Have students circle those family members who work in an agriculture-related business.
5. Have students share findings with the class.

B. Background

Genealogy - history of the descent of a person or family from an ancestor.

Our ancestors started farming about 10,000 years ago. For a million years before that people had been gathering wild fruits and seeds and killing small animals for their families to eat. One day someone noticed grass growing where grain had been spilled or stored the season before. The people got the idea to plant the seeds and see if they could grow the crops they needed and wanted. When they placed the seeds in the ground, they started to grow. Animal husbandry probably began the first time someone managed to tame a wild animal that had been injured or trapped.

People all over the world developed different ways of farming, depending on where they lived. The first colonists in the New World tried to farm the land they found the same way they had farmed in Europe. It didn't work, and they nearly starved. They had to learn to farm like the Indians and grow the crops that would grow well in the place where they had come to live.

Back then nearly everyone had to farm and hunt to provide enough food to keep their families alive. The first U. S. census, taken in 1790, listed 95 percent of the people as rural. That changed after the industrial revolution. Farmers had tools that helped them produce more and more food. When too many farmers started raising too much food, food prices fell, and many farmers could no longer earn enough money to support their families. They were forced to leave the farm and find work in the new industries. In the 1930s much of the farm land in our country started to wear out or erode away. Two million farmers were forced to leave their farms then.

Today only about 2 percent of the people in this country actually live on a

farm or ranch. It is no longer necessary for every family to grow its own food. One American farmer today can feed about 100 people, both in this country and around the world. For every American farmer there are another seven people involved in American **agribusiness**. *That includes thousands of businesses and millions of people who process, deliver and sell food to people all over the world. It includes people who teach agriculture in our state universities and scientists who research the insects and diseases that affect our food supply. It includes bankers who loan money to farmers and ranchers so they can buy the equipment they need, and it includes the people who build and sell that equipment. Agribusiness includes the truckers who haul the cattle to market, the florist who sells a dozen red roses and even the check-out clerk at the grocery store.*

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. **Resources**

Bryan, Ashley, *Dancing Granny,* Macmillan, 1987.
Freedman, Russell, *Children of the Wild West,* Houghton Mifflin, 1983.
Giff, Patricia, *Laura Ingalls Wilder: Growing up in the Little House,* Viking, 1987.
Gorsline, Marie, and Douglas Gorsline, *Pioneers,* Random House, 1982.
Sabin, Francene, *Pioneers,* Troll, 1985.

D. **Evaluation**

Were the students able to complete the family tree and identify individuals who were in some type of agriculture production?

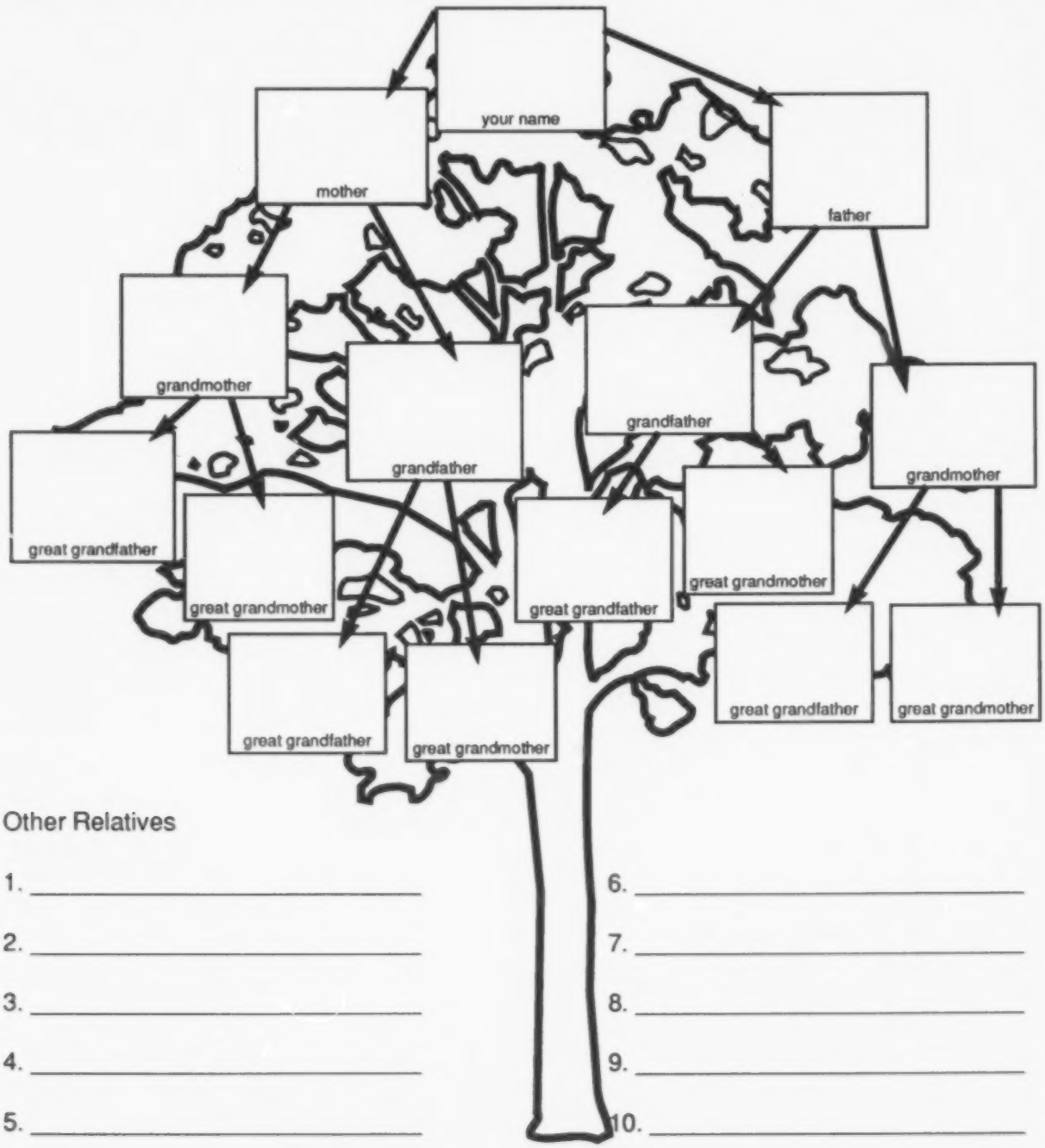
E. **Related Activities**

1. Bring in a guest speaker who lives or has lived on a farm or ranch, and ask him or her to talk about daily rituals and chores.
2. Have students do written or tape-recorded interviews of family members who have lived on a farm/ranch operation or who work in agribusiness. Have students share the interviews with classmates or another class.
3. Have class members bring baby or pre-school pictures in which the student is the only one in the picture. Assign a number to each baby picture, then make a list of all the class members. Have students try to match as many names to the baby pictures as possible. Compare results.

Name _____

Back to the Farm

Fill in the blanks to complete your family tree as completely as possible. Get an adult family member to help. Put a star next to the people who are or were involved in farming or ranching. Circle the people who work in agribusiness.



Other Relatives

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994

Ag in the Classroom

OKLAHOMA GROWN

SUBJECT: Social Studies **GRADES:** 4

AGRICULTURAL TOPIC: Crops **CONCEPT:** I

STUDENT SKILL
The student will interpret various pictorial sources of information such as maps, graphs, charts, globes, pictures and cartoons.

LEARNER OBJECTIVE
The student will learn which Oklahoma crops grow in which counties.

LESSON

A. Step-by-Step Instructions

1. Hand out student worksheets, and have students look at the crop charts as you share the background material.
2. Provide each student with a copy of the Oklahoma counties map at the back of this book. Instruct students to make up simple symbols for each of the major crops on the crop chart. (Draw several possible symbols on the board to get students started, for example: X = wheat; * = cotton; # = soybeans). Encourage them to be creative but keep the symbols as simple as possible. Have each student make a map key on his or her map and use the symbols to show where each crop grows.

B. Background

Oklahoma has 44 million acres of land. Over 11 million acres of that is planted in crops of one kind or another. There are several crops that grow well in Oklahoma. Over half the state's cropland is planted in ***wheat.*** *Wheat needs an average amount of rainfall and cool weather when it first starts to grow. Then it needs bright months late in the spring that gradually turn dry when it is time to harvest in June. Wheat grows well in north central Oklahoma. The winds that sweep across the prairie help the wheat dry in time for harvest.*

Many of the crops that grow in Oklahoma become feed for animals. ***Barley, sorghum, oats, corn*** *and* ***hay*** *are all grown mostly for that purpose. Barley and sorghum grow well in the Oklahoma panhandle, where the weather conditions are dry. Corn grows in the panhandle and eastern Oklahoma. Oats grow well in north and south central Oklahoma.*

Hay is a good crop to grow on land that is rolling and steep. These lands would erode away if they were tilled for row crops. Native grass and ***alfalfa*** *are the most popular kind of hay to grow. Alfalfa grows best where there is average rainfall, cold winters and warm summers. It is* ***drought-resistant,*** *which means it can grow even when there's not much rain.*

Soybeans *are grown for their oil. The oil is used in margarine, shortening and salad oils. It is also used to make paints, ink and even linoleum floors. After the oil is crushed from the beans, the nutritious meal that is left is fed to animals. Soybeans like the warm, moist climate in northeastern Oklahoma.*

Peanuts *and* ***cotton*** *seed can be used for oil in the same ways soybeans are used. Cotton grows well in southwest Oklahoma, where the growing season is long, rainfall is moderate and temperatures stay at around 90 degrees Fahrenheit in the summer. The nuts on a peanut plant grow underground in sandy soils. Sandy soils are usually found near streams and rivers. Most of Oklahoma's peanuts grow in the southwest part of the state. There are four shelling plants in Oklahoma to handle most of the state's crop of Spanish peanuts.*

Oklahoma is one of only 11 states in the U.S. that grows ***pecans****. Pecan trees prefer deep, moist soils. In Oklahoma these soils are usually found along rivers and creeks.*

In the eastern part of Oklahoma, where rainfall is highest, there are small acreages of ***peaches, strawberries, blueberries*** *and* ***blackberries****. Fields of* ***watermelon, sweet corn, muskmelon, green beans, squash*** *and* ***mixed greens*** *grow in several locations all over the state. These crops will end up in your grocery store for you and your family to eat.*

The southeastern corner of the state has ***loblolly pine*** *tree plantations. Pine trees need plenty of water to grow. Loblolly pines grow fast and can be harvested to make furniture, lumber for building houses or paper products. The forestry industry plants over 40,000 acres of new trees every year.*

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Lawlor, Laurie, *Addie Across the Prairie,* Whitman, 1986.
Tresselt, Alvin, *Autumn Harvest,* Lothrop, 1951.
Wilder, Laura Ingalls, *Little House on the Prairie,* Harper Collins, 1981.

Additional Resources

"America the Bountiful," Illinois Farm Bureau, Field Services Division, 1701 Towanda Ave., Bloomington, IL 61701 (U. S. map showing major commodities and facts on agriculture, 20 cents each).

Gopher Crops & Soil Club, Attn. Vernon Cardwell, Department of Agronomy, University of Minnesota, 1991 Buford Circle, St. Paul, MN 55108. (Write for information about samples of crop seeds, weed seeds, crop plants, soil samples.)

Oklahoma State Agronomy Club, c/o Agronomy Department, 369 Ag Hall, Oklahoma State University, Stillwater, Oklahoma 74078, (405)744-6425. (Write for information about crop, seed and weed samples and samples of pressed plants).

Wikle, Tom, ed., Atlas of Oklahoma, Department of Geography, Oklahoma State Univesity, Stillwater, OK 74078 (classroom edition, $10, plus $2 shipping and handling, teacher's guide, $6, plus $1 shipping and handling).

D. Evaluation

Were students able to locate the Oklahoma counties where the major crops grow?

E. Related Activities

1. Have each student make a notebook, with one page for each of the major crops grown in Oklahoma. Ask your county Extension agent for help getting samples of all the crops listed, and give them to students to glue on the appropriate pages. Have them list the counties where each crop is grown. Then have students research the crops to find out in what other parts of the U.S. the crop is grown and what products are made from each one.
2. Cut clean milk cartons in half, and have students plant Oklahoma crops in them. Make sure you label the planters so students can compare the development of the different plants.
3. Have students look at their maps and draw conclusions about where the greatest variety of crops grow. Compare the crop map with the the rainfall map in SS 10, "Where Does the Rain Fall?" What is the average yearly rainfall in the areas where most of the crops grow? Have students brainstorm about other factors that would make certain areas better for growing crops (transportation to market, wide open spaces for large farm machinery, length of growing season, soil type).

Name _____

Oklahoma Grown

All the crops shown on this page grow in Oklahoma. Find the counties where they grow on a map of Oklahoma counties.

Crop	Counties	Counties	Crop
wheat	Grant, Garfield, Texas, Alfalfa, Kay, Custer, Washita, Kiowa , Kingfisher, Woods, Caddo	Wagoner, Muskogee, Mayes, LeFlore, Ottawa, McCurtain, Garvin, Tulsa, Washington, Craig, Sequoyah, Rogers	**soybeans**
peanuts	Caddo, Bryan, Hughes, Love, Grady, Tillman, Marshall, Stephens	Roger Mills, Bryan, Tillman, Custer, Major, Jefferson, Canadian, Noble, Alfalfa	**oats**
cotton	Jackson, Tillman, Washita, Harmon, Kiowa, Greer, Beckham	Cimarron, Kay, Texas, Canadian, Ellis	**barley**
grass hay	Caddo, Grady, Garvin, Bryan, Alfalfa, Muskogee, Canadian,	Alfalfa, Grady, Garvin, McClain, Caddo, Washita	**alfalfa hay**
sorghum	Texas, Cimarron, Beaver, Caddo, Kay, Craig, Ottawa, Beckham, Washita, Blaine, Jackson, Tillman	Texas, Cimarron, Beaver, Bryan, Garvin, Caddo, Muskogee, Sequoyah	**corn**
vegetables	Haskell, Caddo, Custer	Adair, Wagoner, Garvin	**fruits**
pecans	Okmulgee, Tulsa, Ottawa	McCurtain, Pushmataha, Choctaw, Leflore, Latimer	**timber**

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TIME LINE OF THE LAND

SUBJECT: Social Studies **GRADE:** 4

AGRICULTURAL TOPIC: Rural Life **CONCEPT:** III

STUDENT SKILL

The student will design, construct and interpret maps, charts, graphs, tables, and cartoons using data.

LEARNER OBJECTIVE

Students will construct time lines, using historical facts about the development of agriculture.

LESSON

A. Step-by-Step Instructions

1. Discuss with students the visual importance of a time line and why it is an important informational tool.
2. Pass out student worksheet A, and discuss the dates and facts with your students. Divide the class into research teams, and have the teams research any facts class members do not understood. Have the teams report their findings to the class.
3. Pass out the student time line sheets. Have students tape or glue the sections together sequentially in a strip.
4. Read together the facts printed on the lower half of the time line, and discuss the significance of the facts.
5. Instruct students to choose 11 events from student worksheet A and write the important dates in the correct place on the time line.

B. Background

The first agricultural tool was a digging stick. It was used to grub up roots and to dig holes for seeds. Someone had the idea of attaching a crossbar to the stick so the stick could be driven deeper into the soil. That was the first shovel, or spade. A stick with a branch at one end that could be pulled through the ground was the first hoe. Later people started making blades of stone or shell and attaching them to their hoes to give them greater cutting power. Most tools were made from obsidian or flint, two kinds of stone that are easy to carve. A stick used to knock the heads of grain loose from the stalks became a sickle when stone teeth were set along one edge.

After people started raising animals for food, they realized they could also use the animals to help them with their work. The next step was to fasten a heavy hoe behind an animal and get the animal to pull it through the ground.

The change from stone tools to metal tools took place slowly. The discovery of metal gave farmers sharper, stronger blades for hoes, plow points and sickles. Most cultures first used bronze, then iron.

Agriculture in the New World didn't develop in the same way it did in Europe and Asia. There were no metal tools in the Americas until European settlers brought them in the 16th Century. The idea of using animals to help with the work was also new to natives to the New World. When the Europeans began settling in the New World, they taught natives some new agricultural practices and learned some new ones from them, as well.

An amazing variety of agricultural inventions over the past 300 years has made it possible for the American farmer to feed more and more people. When our

country first became a nation, farmers were still relying on animals and their own physical strength to provide the energy needed to grow their food. Today machines are involved in nearly every aspect of farming. Farmers today have even entered the computer age and depend on computers to tell them things like how much to plant and when is the best time to sell. In Oklahoma a new computer network called ***Mesonet*** *even helps farmers predict the weather so they will know the best time to plant and harvest their crops.*

Source: Oklahoma Cooperative Extension Service, Biosystems and Agricultural Engineering, OSU

C. Resources

Anderson, Joan, and George Ancona, *The American Family Farm,* Harcourt, Brace, Jovanovich, 1989.

Collins, David R., *Pioneer Plowmaker: A Story About John Deere,* Carolrhoda, 1990.

Enright, Elizabeth, *Thimble Summer,* Dell, 1987.

Freedman, Russell, *Children of the Wild West,* Houghton Mifflin, 1983.

Freedman, Russell, *Cowboys of the Wild West,* Houghton Mifflin, 1985.

Giff, Patricia, *Laura Ingalls Wilder: Growing Up in the Little House,* Viking, 1987.

Greer, Gery, and Bob Ruddick, *Max and Me and the Wild West,* Harcourt, Brace, Jovanovich, 1988.

Johnson, Tony, *The Cowboy and the Black-Eyed Pea,* Putnam, 1992.

D. Evaluation

Were the students able to place the agriculture-related events in the sequential order on the time line? Do students understand the usefulness of the time line for placing events in history?

E. Related Activities

1. Create a large class time line for display. Enlarge the time line sections, and assign groups to complete each section. Have students illustrate events and place them by the corresponding year.

3. Have students create time lines of their own lives. Encourage them to decide a specific beginning and ending time.

4. Make a class birthday time line. List months instead of years or dates and plot the birthday of everyone in the class.

5. Have students create their own primitive tools, using sticks and stones.

Name _____

Time Line of the Land A

Choose 11 dates that interest you, and use them to complete the time line.

- **1793** Invention of the cotton gin.
- **1796** National Board of Agriculture established by George Washington.
- **1802** First agriculture fair in Arlington, Virginia.
- **1805** Cotton replaces tobacco as main crop in the South.
- **1819** U. S. canning industry started.
- **1837** John Deere manufactures steel plow.
- **1850** Farming of the prairies begins.
- **1854** Development of the modern windmill.
- **1861** Kerosene lamps become popular.
- **1867** Cattle boom. Range wars break out between ranchers and farmers.
- **1874** Barbed wire helps tame the West.
- **1890** Census shows frontier settlement over.
- **1900** George Washington Carver discovers many uses for peanuts and soybeans.
- **1920** Agriculture prices collapse.
- **1932** Dust Bowl conditions develop.
- **1945** Frozen foods become popular.
- **1954** More tractors than work horses on the farm.
- **1960** More shipments of strawberries and fresh flowers made by cargo plane.
- **1972** Russian wheat sales bring higher farm prices.
- **1986** Anti-smoking campaigns cut tobacco production.
- **1986** Worst drought ever to hit Midwest farmers.
- **1993** Flooding along the Mississippi River destroys Midwestern crops.

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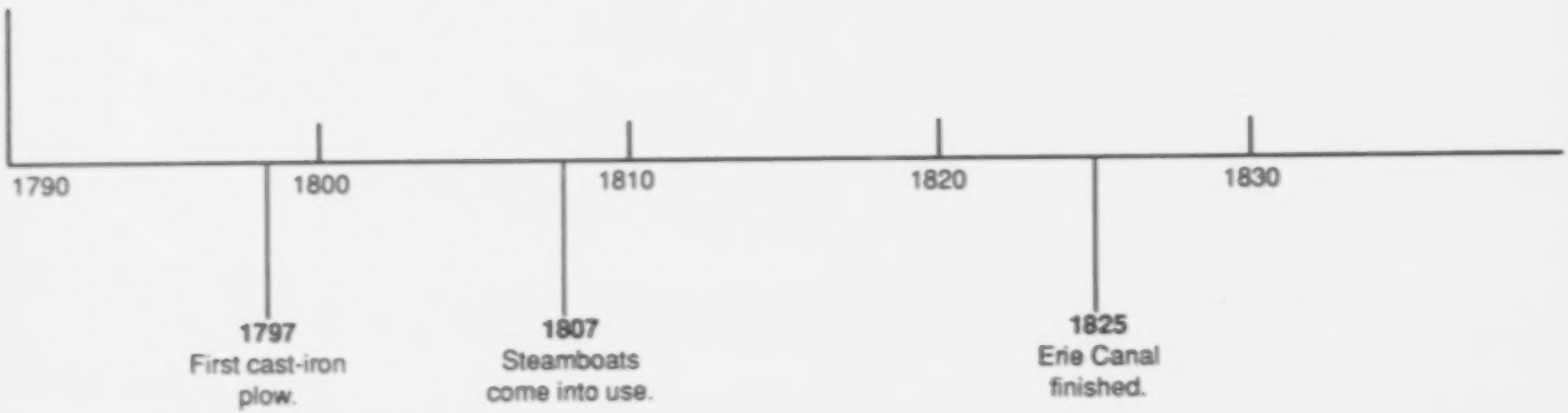
Name_____

Time Line of the Land

B



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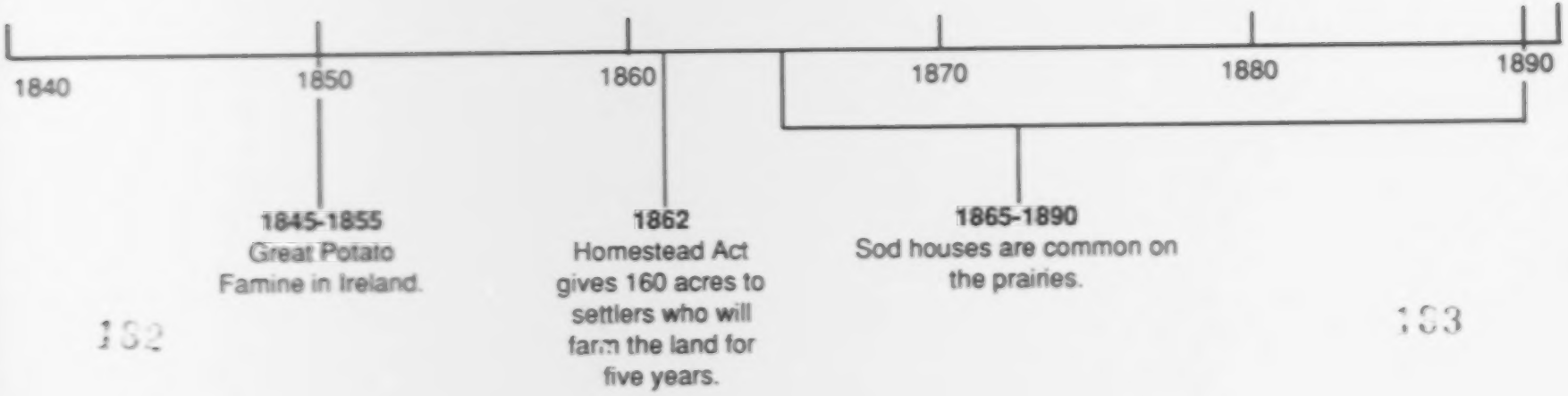
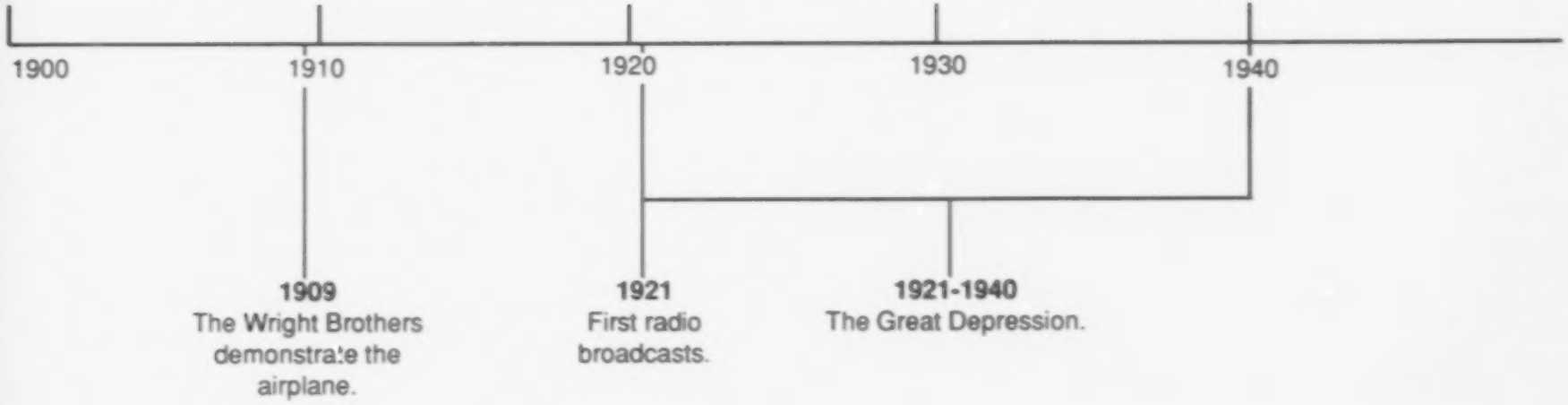
Name_____

C


1840
1850
1860
1870
1880
1890
1845-1855
Great Potato Famine in Ireland.
1862
Homestead Act gives 160 acres to settlers who will farm the land for five years.
1865-1890
Sod houses are common on the prairies.

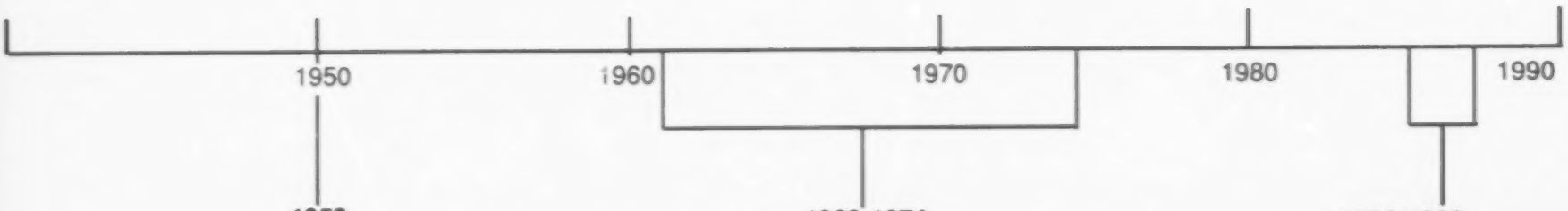
Name _____

D


1900
1910
1920
1930
1940
1909
The Wright Brothers demonstrate the airplane.
1921
First radio broadcasts.
1921-1940
The Great Depression.

Name_____

E



1950
One farmer supplies food and fiber for 15 persons in the U. S. and the world.

1963-1974
The Vietnam War.

1986-1988
Country singer Willie Nelson organizes Farm Aid Concerts to raise money for indebted farms.

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186

THE TRADING GAME

SUBJECT: Social Studies **GRADE:** 4

AGRICULTURAL TOPIC: Economics **CONCEPT:** II

STUDENT SKILLS

The student will explain the ways in which economic and natural resources impact the growth of Oklahoma.

LEARNER OBJECTIVE

The student will play a game aimed at teaching how relationships with other communities affect our agricultural system. The game simulates the unequal distribution of natural resources which creates the need for interdependent relationships between communities.

LESSON

A. Step-by-Step Instructions

1. Prepare four large manila envelopes, using the teacher instructions on the following page.
2. Share background material with your students.
3. Divide the class into four groups, representing four different communities. Instruct each group to give itself a name. List the communities on the board. Have each community select a leader.
4. Give each leader one of the envelopes you have prepared. Instruct students not to open their envelopes until told to do so. Tell students that each community should complete the task sheet in its envelope, even though all the resources needed to do so won't be in the envelope. Tell students they must trade with the other communities in any way necessary to complete the task sheets. The first community to complete the task sheet is the winner.
5. Give the signal to begin. Watch the communities as they complete their tasks. Note comments community members make as they try to complete their tasks. Post on the board the order in which each community completes its task.
6. Use the questions at the bottom of the teacher instruction page to lead a class discussion.

B. Background

Have you ever traded a ham sandwich in your lunch sack for someone else's peanut butter and jelly? How about one comic book for another, or a baseball card or a toy?

Before there was money, people traded ***goods*** *with one another for the things they needed. Ancient people traded things like animal furs and meat for medicinal herbs and vegetables. Some of the earliest Europeans in the New World were French fur traders. The Indians traded their furs for beads, blankets and other goods the French traders could get from Europe.*

In our country's early history, most families grew their own food and even raised the plants and animals they needed to make their own clothing. Even then, families sometimes had to trade with their neighbors for the things they needed. Sometimes one family would have dairy cows, while another would have chickens. Then the family with the dairy cow would trade milk and butter for eggs and other things they needed. This is called ***bartering****.*

Money has taken the place of bartering today, but people still have to depend on other people to meet all their needs. For example, people who live in cities can't

grow their own food. They have to depend on farm communities for that. In cities there are factories that produce the equipment farmers need to keep their farms going. Here in Oklahoma we can grow wheat, but we can't grow oranges. Oklahoma wheat farmers sell their wheat so it can be made into wheat products and sold in supermarkets all over the country. They take the money to the grocery store and buy things like oranges, which probably grew in Texas or California or Florida.

We grow soybeans in Oklahoma, too. Most of the soybeans grown here are pressed for their oil. The meal that remains is fed to livestock. Foods made from soybeans aren't very popular in our country, but in many Asian countries, soy products like tofu (soybean curd) and miso (a paste used for soup stock made with fermented soybeans and rice) are very important foods. Since soybeans grow better here than they do in Asian countries, we sell some of our soybeans over there. This is called **export.**

Our climate doesn't allow us to grow things like coffee or bananas, so we have to buy those things from countries like Columbia and Argentina. This is called import.

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Books

Adams, Barbara J., *The Go-Around Dollar*, Macmillan, 1992.
Brittain, Bill, *All the Money in the World*, Harper Collins, 1979.
Byers, Patricia, and Julia Preston, *The Kids' Money Book*, Liberty, 1983.
Cook, Janet, and Shirley Bond, *Where Food Comes From*, EDC, 1988.
Elkin, Benjamin, *Money*, Children's Press, 1983.
Horwitz, Joshua, *Night Markets: Bring Food to the City*, Harper Collins, 1986.

Additional Resources

"Food for America," National FFA Supply Service, 5632 Mt. Vernon Memorial Highway, Alexandria, VA 22309 (teaching guide with activities, $7.50 per kit).

D. Evaluation

Were students able to complete the activity? Did the activity stimulate discussion?

E. Related Activities

1. Ask students if they can think of every-day ways in which they use the barter and trade system. It can be at home with siblings or with friends at school. List responses on the board.
2. Brainstorm items that early settlers might have bartered and traded. List these items on the board. What are some things the early settlers had to purchase from a store. Why?
3. Have each student research one of his or her favorite foods to find out where it is grown. Is it an import or an export?

THE TRADING GAME

Teacher Instructions

Prepare four manila envelopes, as follows:

Envelope #1

Two pairs scissors
20 paper clips
Two four-inch squares of red paper
Two four-inch squares of white paper
One ruler
Two pencils
One task card, on which you have written these instructions:
"Make four strips of gold paper, each three inches by one inch."

Envelope #2

One pair scissors
Two sheets of blue paper
Two sheets of gold paper
One bottle of glue
Two sheets of white paper
One task sheet, on which you have written these instructions:
"Make a green 'T' four inches high."

Envelope #3

Two felt pens
Two sheets of white paper
Two sheets of green paper
Two sheets of gold paper
One task sheet, on which you have written these instructions:
"Make a four-inch link paper chain, with each link a different color."

Envelope #4

One sheet of green paper
One sheet of blue paper
One sheet of purple paper
One sheet of gold paper
One sheet of red paper
One task sheet, on which you have written these instructions:
"Make a two-inch white square. Attach a gold triangle to one side of the square."

After students have completed the activity, lead a discussion, using the following questions:

1. *Could you have completed your tasks without trading resources with another community? Why, or why not?*
2. *How did your community solve the problem of not having all the resources it needed?*
3. *Were there any conflicts between communities? Why, or why not?*
4. *How did you feel when you realized the resources were unequally distributed?*
5. *Give some examples of innovative or unusual ways in which your community completed its task.*
6. *How do our relationships with other communities affect our agricultural system?*

WHAT'S YOUR BRAND?

SUBJECT: Social Studies **GRADE:** 4

AGRICULTURAL TOPIC: Beef **CONCEPTS:** III

STUDENT SKILL

The student will analyze the effect of geography on the course of each region's history.

LEARNER OBJECTIVE

Students will become aware of the purpose of cattle brands and their designs.

LESSON

A. Step-by-Step Instructions

1. Share background information with your students.
2. Hand out student worksheets.
3. Have students complete worksheets, either individually or in small groups.
4. Have students design their own brands. Use the information on the student worksheet.

B. Background

The early Egyptians were branding their livestock with simple patterns as early as 2,000 B.C. The Spanish conqueror Hernando Cortez brought the practice of branding horses and cattle to North American in the 16th Century. The American custom of branding cattle came from Mexico. Mexican ***caballero*** *(cowboys) would mark the large herds with the owner's coat of arms. Today there are hundreds of thousands of cattle brands registered throughout the United States. Animals can be branded with chemicals, paint, by tattooing or even by tagging or notching.*

Source: Oklahoma Cooperative Extension Service, Animal Sciences, OSU

C. Resources

Books

McCaulay, David, *Baaa!*, Houghton Mifflin, 1983.
Miller, Robert, *Cowboys*, Silver-Burdett, 1991.
Pryor, Bonnie, *Mr. Munday and the Rustlers*, Simon and Schuster, 1987.
Warner, Gertrude, *Mystery Ranch*, Whiteman, 1986.

Additional Resources

Oklahoma Beef Industry Council, 5101 N. Classen, Ste. 210, Oklahoma City, OK 73118.
"Twelve Myths and Facts," National Cattlemen's Association, 5420 S. Quebec St., Englewood, CO 80155 (videotape for grades 1-3 and 4-6, $15).

D. Evaluation

Answers for student worksheet B are as follows: 1. numbers, letters, and/or pictures; 2. Diamond B Ranch, D Bar T Ranch, PM Ranch; 3. (see designs on student worksheet A); 4. The student may list any state in the central or western part of the United States; 5. Yes; 6. No; 7. two, four.

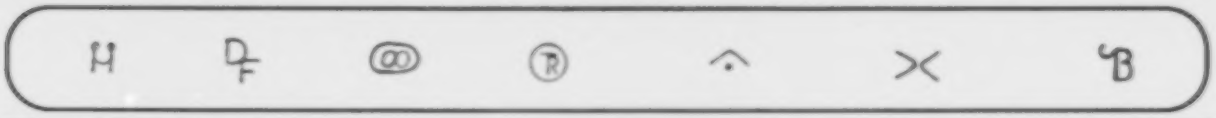
E. Related Activities

1. Provide students with pipe cleaners to form their own brands. Have students dip their brand designs in tempera paint and brand construction paper cattle. Find the

cattle outline in pattern pages featured in the back of the book.
2. Bring scrap lumber and a woodburning kit to class, and allow students to burn their brands into the wood. Use baling wire or barbed wire to hang the branded wood for display.
3. Make western handkerchiefs. Enlist the help of parents to cut 24-inch squares of muslin for each student and reinforce them by machine-stitching one-half inch from the edges. Provide each student with a black permanent marker to draw his or her own brand on the scarf. Have students repeat their designs all over, and unravel the edges to the machine-stitching for a rustic look.

Name_____

What's Your Brand? A



Herdsmen have been branding their own cattle, sheep and horses for thousands of years. Branding is the best way anyone has found to show who owns what animals.

Many times the brand will tell you something about the animal's owner or the ranch to which it belongs. A brand with two Rs might be the initials of the owner or it might be the initials of two different people who are partners on the ranch. A line drawing showing two people shaking hands might tell you friendship is important to the owner.

If you think branding hurts the animal you are probably right, but it may not hurt as much as you imagine. Animal hide is thicker and tougher than your skin. Sometimes the brand will singe and burn the long hair on an animal, and that will cause some pain as well. The mark that is left is similar to a scar. It cannot be removed.

Sheep are branded with paint or ink which comes off when the wool is sheared from the sheep.

When an owner gets ready to design a brand, he or she must be careful not to use one that is already registered. A book showing all the registered brands in the state can give the rancher ideas, but he or she cannot copy any registered brand for his or her own use. In Oklahoma, it is legal for one person to buy a brand from another person.

Designs may be letters, numbers, pictures or a combination of all these things. The design must be simple enough to shape with metal or carve into wood, and it must be easy to read. Brands are usually two or more inches tall and four or more inches long.

Designs can be:

open; **closed;**

crazy; **lazy;** **rocking.**

Designs are read from:

outside to inside;

Diamond B Ranch

top to bottom.

BC Ranch

left to right;

S Bar Ranch

A design can have a simple picture, an arrow, a star or a house.

For example: **stands for Tumbling L Ranch.**

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Name _____

What's Your Brand? B

Read the information on student worksheet A, then answer the following questions.

1. Brands designs may be made from _____,
_____ and _____.
2. Write out the ranch names expressed in the following brands.

_____ Ranch

_____ Ranch

_____Ranch

3. Draw a brand that is:

Lazy_____

Open_____

Closed_____

Letters_____

Numbers_____

4. Branding first became popular among ranchers in the Plains and Western states of the United States. Name two states that are located in the Plains or Western states.

_____ and _____

5. Can an Oklahoma brand be sold? Yes or No

6. Are all brands permanent? Yes or No

7. A brand is _____or more inches tall and _____or more inches long.

* Design your own brand. Remember to make it simple. Follow the design rules. Don't forget your brand should mean something.

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Name _____

What's Your Brand? (Answers) B

Read the information on student worksheet A, then answer the following questions.

1. Brands designs may be made from **letters, numbers** and/or **pictures.**
2. Write out the ranch names expressed in the following brands.

_____ **Diamond B** _____ Ranch

_____ **D bar T** _____ Ranch

_____ **P M** _____ Ranch

3. Draw a brand that is:

Lazy_____

Open_____

Closed_____

Letters_____

Numbers_____

4. Branding first became popular among ranchers in the Plains and western states of the wild west. Name two states that are located in the Plains or western states. **Oklahoma, Texas, Kansas, North Dakota, South Dakota, Nebraska, Wyoming, Montana, Colorado, New Mexico, California, Utah, Idaho**
5. Can an Oklahoma brand be sold? **Yes**
6. Are heated brands permanent? **Yes**
7. A brand is **two** or more inches tall and **four** or more inches long.

* Design your own brand. Remember to make it simple. Follow the design rules. Don't forget your brand should mean something.

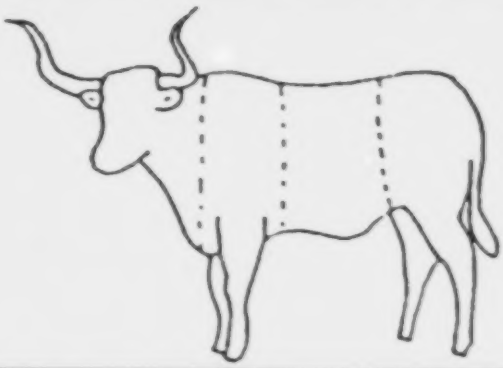
Produced by Oklahoma State University Cooperative Extension Service, in cooperation with the Oklahoma Department of Agriculture, 1993.

Name _____

What's Your Brand? C

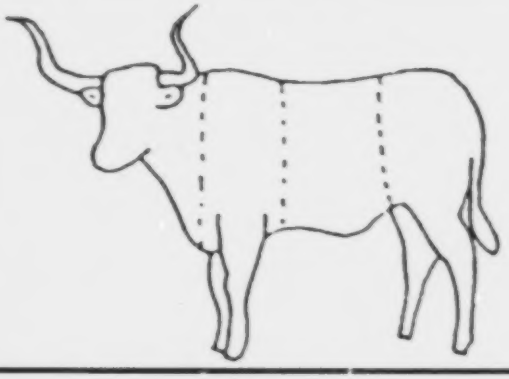
Place the brand you designed on the hip, shoulder and side of the steer pictured below. Write the name of the body part on the line next to each steer. Color the steers.

1.



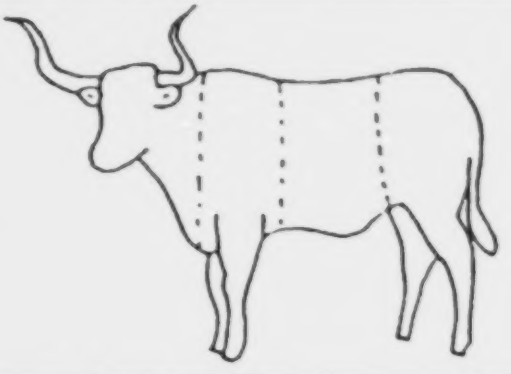
1. _____

2.



2. _____

3.



3. _____

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WHERE DOES THE RAIN FALL?

SUBJECT: Social Studies **GRADE:** 4

AGRICULTURAL TOPIC: Forestry **CONCEPT:** IV

STUDENT SKILL

The students will interpret various pictorial sources of information, such as graphs, charts, globes, pictures and cartoons.

LEARNER OBJECTIVE

The student will learn which parts of Oklahoma get the most and least amounts of rainfall.

LESSON

A. Step-by-Step Instructions

1. Share background information with your students.
2. Divide students into groups of three or four, and provide each group with a road map of Oklahoma. Make sure the maps have location keys. The Oklahoma Department of Tourism will provide state maps, in quantity, free of charge, if request is made on school letterhead.
3. Hand out student worksheets, and have students look at the list of towns and cities on worksheet A. Students should use the location key on the Oklahoma road map to locate each town or city and write in the average yearly rainfall.
4. After students have located all the cities, have them color in the areas defined on the map, using the colors listed in the map key.

B. Background

Did you ever plant an orange seed in your backyard and wonder why the tree that sprouted was dead the following spring? It's because oranges can't grow in Oklahoma's climate. Climate is the word we use when we're talking about how hot or cold a place is, how much rain and snow falls and how much the wind blows. Orange trees take a long time to grow and can't live through Oklahoma's freezing winter weather.

Some fruits grow just fine in Oklahoma, though. Peaches and strawberries don't need such a long growing season, and eastern Oklahoma gets plenty of rainfall for growing those fruits.

There are several different kinds of crops that will grow in Oklahoma. That's because there are several different climates here. If you got in your car on a January day and drove from Idabel to Woodward, you would be able to feel the difference. It would be cold in Idabel, maybe just about 10 degrees above freezing, and it probably would be raining. When you arrived in Woodward, about five hours later, the sun might be shining, but it wouldn't be any warmer. It would be about 10 degrees colder, and the wind would be blowing so hard it would seem even colder that that.

Even if you stayed home, the temperature might change quite a bit from one day to the next. One day it might be raining or snowing. The next day the sun might be shining.

Why does the climate in Oklahoma change so much from northwest to southeast and from one day to the next? Since we're right in the middle of the continent, winds from all directions bump into each other here. So the weather is changing all the time.

If we lived near an ocean or some other large body of water, the water would take in some of the sun's heat so it wouldn't be so hot on the land. If we had mountains to the north of us, the mountains would help keep the cold north winds out. But since Oklahoma is in the plains, away from oceans and large mountains,

the winds sweep right through, and the sun beats down, with nothing but the earth to absorb it.

In most years about 34 inches of rain falls in Oklahoma. Winters are usually short, and the ground never freezes for very long. Summers are long and hot. The highest temperature ever recorded in Oklahoma was 120 degrees Fahrenheit, on July 26, 1943, in Tishomingo. The coldest temperature was -27 degrees Fahrenheit, in the city of Watts, on January 18, 1930.

Source: Oklahoma Cooperative Extension, Division of Agricultural Sciences and Natural Resources, OSU

C. Resources

Books

Branley, Franklyn, *Sunshine Makes the Seasons,* Harper and Row, 1985.

Lambert, David, *Weather,* Troll, 1990.

Markle, Sandra, *Exploring Winter: A Season of Science Activities, Puzzles and Games,* Atheneum, 1984.

Ruckman, Ivy, *Night of the Twisters,* Crowell, 1986.

Additional Resources

"Landform of the Coterminous United States: A Digital Shaded Relief Portrayal," U.S. Geologic Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225 (computer image, based on contour lines detailing rock types, faults/folds and mountain types, explanation book included, $5, plus $1 shipping for orders under $10).

Triangle Coalition for Science and Technology Education, c/o NSTA Special Projects, 5112 Berwyn Rd., 3rd Floor, College Park, MD 20740 (send for information on the National Balloon Launch for Weather Studies).

Wikle, Tom, ed., Atlas of Oklahoma, Department of Geography, Oklahoma State University, Stillwater, OK 74078 (classroom edition, $10, plus $2 shipping and handling, teacher's guide, $6, plus $1 shipping and handling).

D. Evaluation

Were students able to find the cities on the map? Were they able to see the different rainfall areas?

E. Related Activities

1. Divide students into groups of four or five, and provide them with Oklahoma road maps. Have the groups figure out how to get from Idabel to Guymon, using Oklahoma highways. Have students use the mileage chart on the Oklahoma road map to figure out the mileage from your community to Idabel and to Guymon.
2. Bring a rain gauge and outdoor thermometer to class, and have students keep track of the precipitation and temperature for a month. At the end of the month, have students find the daily average precipitation and temperature for that month. Have students correspond with students in different parts of the state and ask for monthly reports on the average precipitation and temperatures. Have students keep graphs or charts showing the state averages.
3. Have students bring orange, grapefruit and lemon seeds to class. Fill clean milk cartons with potting soil, and plant two or three seeds in each one. If more than one seedling comes up in a carton, pull out all but the strongest one. Place the cartons in a sunny window, and have students chart their growth over the school year.

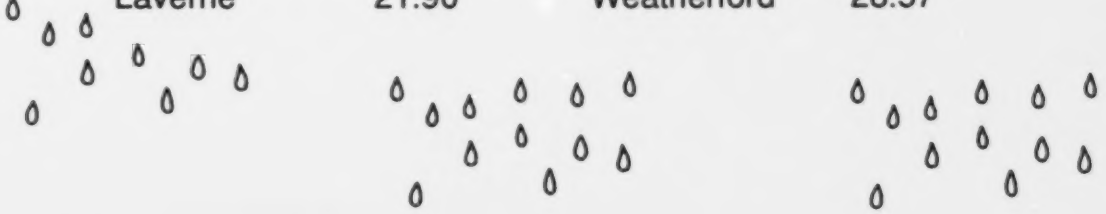
Name _____

Where Does the Rain Fall? A

The towns and cities listed below are shown as raindrops on the map on worksheet B. Look for the towns and cities on an Oklahoma road map. Then write the average rainfall next to the correct raindrop. Color the map.

Average Yearly Rainfall—Oklahoma Cities and Towns

Antlers	45.60	Lindsay	35.11
Apache	30.42	Marietta	36.57
Ardmore	35.90	Marshall	30.52
Boise City	17.21	Meeker	35.41
Elk City	26.89	Miami	44.10
Enid	32.35	Nowata	39.85
Fanshawe	48.08	Pawhuska	38.43
Freedom	24.04	Pontotoc	39.24
Gage	20.56	Pryor	41.53
Goodwell	16.91	Quinton	44.22
Helena	28.12	Renfrow	29.16
Hobart	26.03	Sallisaw	44.98
Holdenville	38.27	Taloga	26.62
Kingfisher	30.45	Union City	35.32
Konawa	37.79	Vinson	23.17
Laverne	21.90	Weatherford	28.57



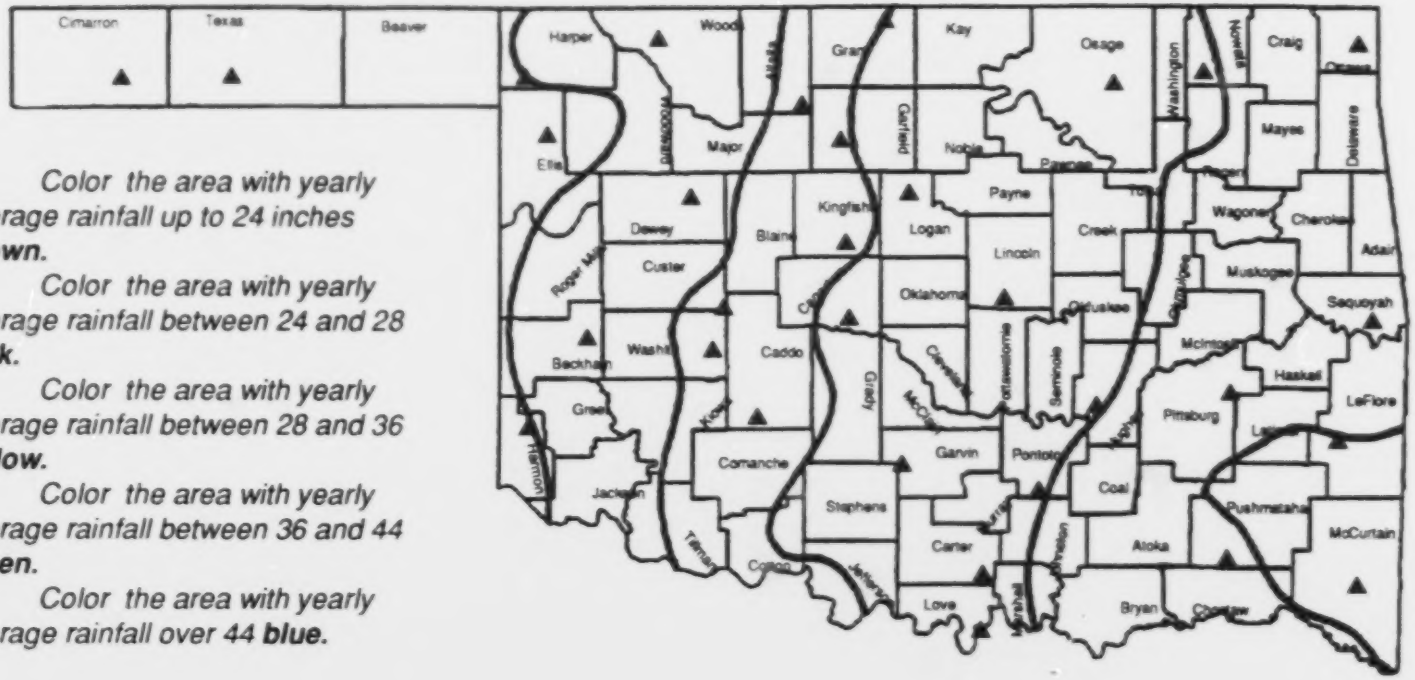
Source: Oklahoma Climatological Survey, Universtiy of Oklahoma, Norman.

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Name_____

Where Does the Rain Fall?

B



Color the area with yearly average rainfall up to 24 inches ***brown.***

Color the area with yearly average rainfall between 24 and 28 ***pink.***

Color the area with yearly average rainfall between 28 and 36 ***yellow.***

Color the area with yearly average rainfall between 36 and 44 ***green.***

Color the area with yearly average rainfall over 44 ***blue.***

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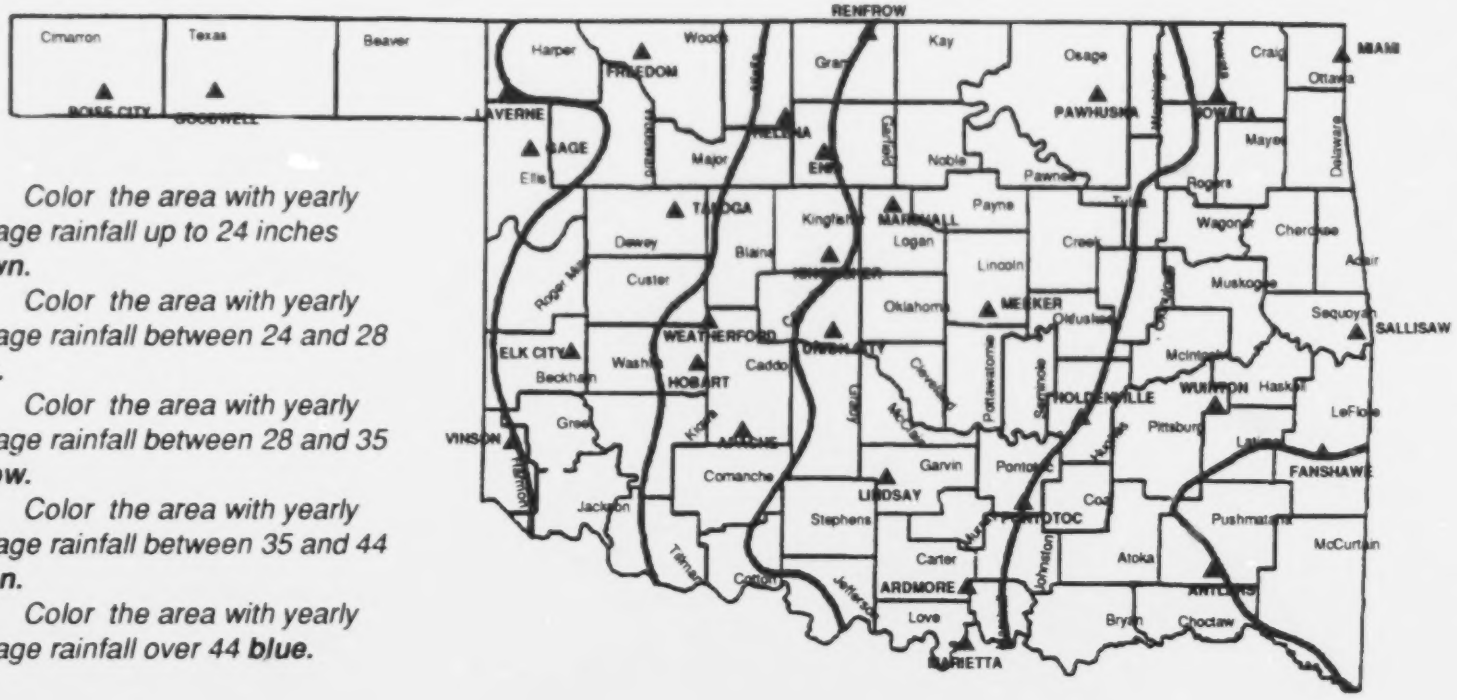
Name _____

Where Does the Rain Fall? (Answer Key) B



Color the area with yearly average rainfall up to 24 inches ***brown.***

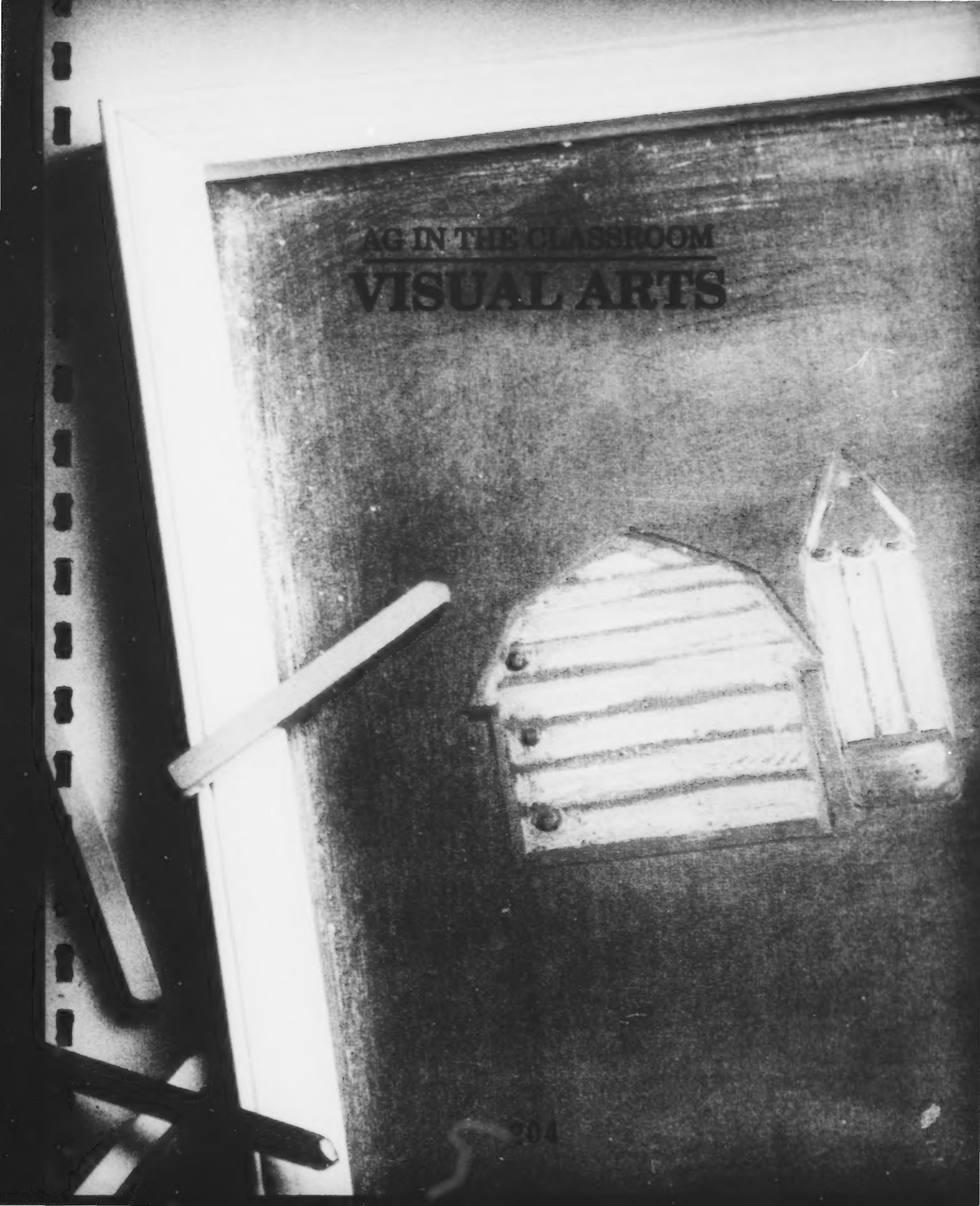
Color the area with yearly average rainfall between 24 and 28 ***pink.***

Color the area with yearly average rainfall between 28 and 35 ***yellow.***

Color the area with yearly average rainfall between 35 and 44 ***green.***

Color the area with yearly average rainfall over 44 ***blue.***

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994


AG IN THE CLASSROOM
VISUAL ARTS

COVERED IN QUILTS

SUBJECT: Visual Arts **GRADE:** 3-4

AGRICULTURAL TOPIC: Cotton **CONCEPT:** III

STUDENT SKILL

The student will identify uses of visual art in a historical and cultural context.

LEARNER OBJECTIVE

The student will create a quilt block, using several colors and an assortment of geometric shapes.

LESSON

A. Step-by-Step Instructions

1. Bring pictures of quilts or actual quilts for students to examine. Share background material.
2. Explain to students that they will be designing their own blocks. Provide construction paper in several colors. Instruct students to cut a nine-inch square from the color of their choice.
3. Draw a variety of geometric shapes on the board, or hand out geometric manipulative shapes which students may use as patterns.
4. Instruct students to choose the colors they wish to use in their quilts and cut them into the geometric shapes they prefer. Bring quilt books to class from which students can get ideas for designs, or use the quilt patterns found in the pattern page section of the book.
5. Have students explain their blocks. Ask why they chose the colors they chose and how they arrived at their designs.

B. Background

Women have used quilts as a practical form of art expression for many years. In the past, quilts served an important purpose. They were an economical way for women to keep their families warm in the wintertime. Women would stitch together flour sacks made from cotton, worn out work jeans or scraps of material from well worn, outgrown clothing.

The seamstress would ***piece*** *the scraps together to make a square, called a* ***block****. When she had enough squares to make a cover for the bed, she would stitch them all together to make the top of the quilt.*

The back of the quilt was usually made from cotton feed sacks. The seamstress would rip the seams out of the feed sack to form a solid piece of fabric and sew two or three together to form the back of the quilt.

Cotton ***batting*** *was placed between the two layers to provide insulation. Cotton batting is cotton fiber from the cotton plant which has been wadded into rolls or sheets. If the seamstress was making the quilt for someone else, to earn extra money, she would be very careful to remove all the seeds, twigs and leaves from the batting. She did that to make sure there were no lumps in the quilt. If she was making it for her family, she would sometimes leave a few leaves and seeds inside. In some quilts that are very old you can still feel the seeds and twigs between the quilt layers.*

Quilts were usually made from cotton, because it was easy to hand-stitch and held its shape well. Cotton absorbs moisture and allows it to evaporate. It is also easy to wash and springs back into its original shape after washing. Cotton fabric is extremely durable and has been used to make clothing or coverings since around

2200 B.C.

Quilting bees were popular gatherings for women and young girls. They were the best place for young girls to learn to quilt and visit with their friends at the same time. Friends would come together in someone's home and work together to complete a quilt. Many times the women in a community would get together and make a quilt to celebrate a milestone in someone's life. They would make quilts to celebrate the marriage of a young couple, the birth of a baby, a prosperous harvest or even a death in the family.

Today quilting is no longer just a woman's art. Artists, some of whom are men, experiment with shades, shapes and texture to create beautiful works of art. Today quilts are as likely to be used to decorate a wall as to provide warmth. Numerous U.S. museums own quilts and display them as historical works of art.

Source: Oklahoma Cooperative Extension Service, Department of Housing, Design and Merchandising, OSU

C. Resources

Books

Amor, Jennifer, *Flavor Quilts for Kids to Make*, American Quilter's Society, 1991.
Carrie, Christopher, *Quilts to Unusual Unicorns*, Binney and Smith, 1989.
Ernst, Lisa, *Sam Johnson and the Blue Ribbon Quilt*, Morrow, 1992.
Flournoy, Valerie, *The Patchwork Quilt*, Dial, 1985.
Polacco, Patricia, *The Keeping Quilt*, Simon and Schuster, 1988.

Additional Resources

American Quilter's Society, P.O. Box 3290, Paducah, KY 42002-3290.
"The Story of Cotton," National Cotton Council, Communications Service, P.O. Box 12285, Memphis, TN 38182 (classroom packet with cotton sample, film strip, informational booklet and a wall chart on cotton, $15, including postage).

D. Evaluation

Did the students enjoy creating their own quilt blocks? Were they able to make the geometric shapes fit together?

E. Related Activities

1. Display the quilt blocks in your classroom. Have students use quilt books to research the designs they have used and find historic facts about them. Then invite another class in, and have students share their findings.
2. Make a paper quilt by taping all the class quilt blocks together. Display for others to enjoy.
3. Invite members of a local quilting group to visit your classroom and show some of their creations. Ask the visitors to bring a small quilting frame, if possible, and some cotton batting. Encourage them to teach students some basic quilting stitches and to talk about how they go about planning a quilt.

DIRTY PICTURES

SUBJECT: Visual Arts **GRADE:** 3-4

AGRICULTURAL TOPIC: Soils **CONCEPT:** III

STUDENT SKILL

The student will use a variety of subjects, materials (media) and techniques in making original art.

LEARNER OBJECTIVE

The student will create art work, using different soil samples as the art media.

LESSON

A. Step-by-Step Instructions

1. Have students bring soil samples from home or the surrounding community. Monitor to see that the soil samples are of a variety of hues.
2. Separate samples by hue, and spread them on newspapers for several days, until the soil is completely dry.
3. Have students sift the soil samples through wire mesh to screen out twigs, clumps, etc. Instruct students to sift the soil several times until they have a very fine powder.
4. Provide students with metal or plastic bowls and thick dowels to serve as mortars and pestles. Have students pour the samples into the bowls and crush the soil with the dowels. Store the fine powder in airtight containers, freezer bags or butter tubs until ready to use.
5. Provide students with heavy cardstock, glue and cotton swabs, tooth picks or fine paint brushes. Have students "paint" their own designs in glue on the cardstock. Next instruct them to carefully sprinkle the fine soil samples to cover all the glue, using a plastic spoon. Allow the pictures to dry overnight. Students should shake the excess dirt over the trash can before displaying their "dirty" pictures.

B. Background

Soils come in a wonderful range of hues, from black to yellow to deep red. Oklahoma is well known for the fields of red soil you can see as you drive along the highways during the late summer or early fall. The red color is caused by the large proportion of iron in the soil. If you have ever seen a rusty iron pipe you can see why iron makes the soil red.

American Indians take advantage of the many different hues of the soil to make ceremonial paints they use on their faces and other parts of their bodies. Indians in the southwest look for particular kinds of clay for making their pots. Different hues of clay are used to create a variety of beautiful colors. Some are used as paint to make patterns on the pots. The Plains Indians also used different colored soils for painting their buckskin robes and tipis. Sometimes crushed berries, flowers and other things from nature were mixed with the mud to create different colors.

Source: Oklahoma Cooperative Extension Service, Agronomy, OSU

C. Resources

Books

Cole, Joanna, *The Magic School Bus Inside the Earth*, Scholastic, 1987.
Ruspoli, Mario, *The Cave of Lascaux: The Funal Photographs*, Adams, 1986.

Stille, Darlene, *Soil Erosion and Pollution, A New True Book*, Children's Press, 1990.
Wallace, Bill, *Danger in Quicksand Swamp*, Minstrel, 1991.
Wyler, Rose, *Science Fun with Mud and Dirt*, Simon and Schuster, 1987.

Additional Resources

Soil Conservation Service, USDA, P.O. Box 2890, Washington, D.C. 20013.
Riverside-Corona Resource Conservation District, 2023 Chicago Avenue, B-14, Riverside, CA 92507-2305 (eight-page activity packet, with hands-on soil project. Minimal charge for teachers outside the district.)

D. Evaluation

Did the students display creativity in their mud art creations?

E. Related Activities

1. Make a soil chart showing where the different soil samples were dug. Chart distances from the school.
2. Save the remnants of each screening from the activity above, and provide students with hand lenses to examine the particles.
3. Create mud art. Tell students ahead of time to wear suitable clothes for a messy art activity. Use cardboard or wood for the base of the mud creations. Mix soil and water to the desired consistency. Pile the dirt on the base, and invite students to start creating. Students may use their fingers, sticks or any other utensil. They may press natural articles (flower petals, stones, leaves) into their creations for added interest. Allow the creations to dry, and have a mud art show for another class.
4. Make "edible" clay. Grease your measuring cup with vegetable oil before mixing two cups of peanut butter with one cup of honey. Add three cups of instant dry milk, a little at a time, until the mixture is stiff. Cover students' desks with wax paper, and spoon out the "edible clay" to each student. Make sure students have clean hands, and allow them to experiment and create with the clay. Photograph the creations for a bulletin board display before inviting students to eat their art. This recipe makes enough clay for 18 students.
5. Have students research mortars and pestles to find out what they are used for and by whom.

A LICENSE FOR AG

SUBJECT: Visual Arts **GRADE:** 3-4

AGRICULTURAL TOPIC: Economics **CONCEPT:** II

STUDENT SKILL

The student will engage in creative drawing, painting, designing, sculpting, constructing, weaving and printmaking.

LEARNER OBJECTIVE

The student will design a vehicle license plate that reflects the agricultural industry in Oklahoma.

LESSON

A. Step-by-Step Instructions

1. Lead a discussion in which you discuss the design on Oklahoma license plates. *Why do you think this design was chosen to represent Oklahoma? What does this design say about Oklahoma? Does it reflect our state's nickname or the state's motto?*
2. Brainstorm the major crops or agricultural products that are produced in Oklahoma, and make a list on the chalkboard.
3. Have students cut six- by 12-inch rectangles from heavy cardstock or construction paper.
4. Have students use the rectangles to design their own license plates to reflect one or more of the agricultural products you have listed on the board. Designs should be as simple as possible, with eye-catching colors and large lettering. Remind students to use the available space wisely.

B. Background

What is a license plate for? The numbers and letters help law enforcement people identify owner of the vehicle. But what about the slogan and the picture on the plate? The slogan and the picture tell other drivers something about the state where the driver lives.

South Dakota's plate has a picture of Mount Rushmore, with the four president's heads; so you know if you want to see Mount Rushmore, you have to go to South Dakota. New Mexico's plate says "Land of Enchantment." New York state's has a picture of the Statue of Liberty. Colorado has a picture of the Rocky Mountains.

All Oklahoma license plates have the words "Oklahoma is OK" printed at the top. Some of them also have our state symbol. The state symbol is an Osage warrior's buckskin shield, with a peace pipe and olive branch crossing over the shield. The peace pipe and olive branch are symbols of peace.

The Osage shield is a strong symbol for Oklahoma, since Oklahoma has the largest native American population in the nation. Agriculture is a strong symbol for Oklahoma, too, because agriculture is Oklahoma's number one industry. Oklahoma is number one in quarterhorse production, number two in hard red winter wheat production and number four in cattle production. The cattle industry is the number one money-making agricultural commodity in our state. Other agricultural crops or commodities that contribute heavily to our state in jobs and income are peanuts, catfish, cotton, pecans, sorghum, and broiler chickens.

Source: Oklahoma Cooperative Extension Service, Agricultural Economics, OSU

C. Resources

Horwitz, Joshua, *Night Markets: Bringing Food to the City,* Harper Collins, 1986.
Levine, Ellen, *If You Traveled West in a Covered Wagon,* Scholastic, 1986.
Levinson, Nancy, *Clara and the Bookwagon,* Harper Collins, 1988.
Stephen, R. J., *Farm Machinery, Picture Library,* Franklin Watts, 1987.

D. Evaluation

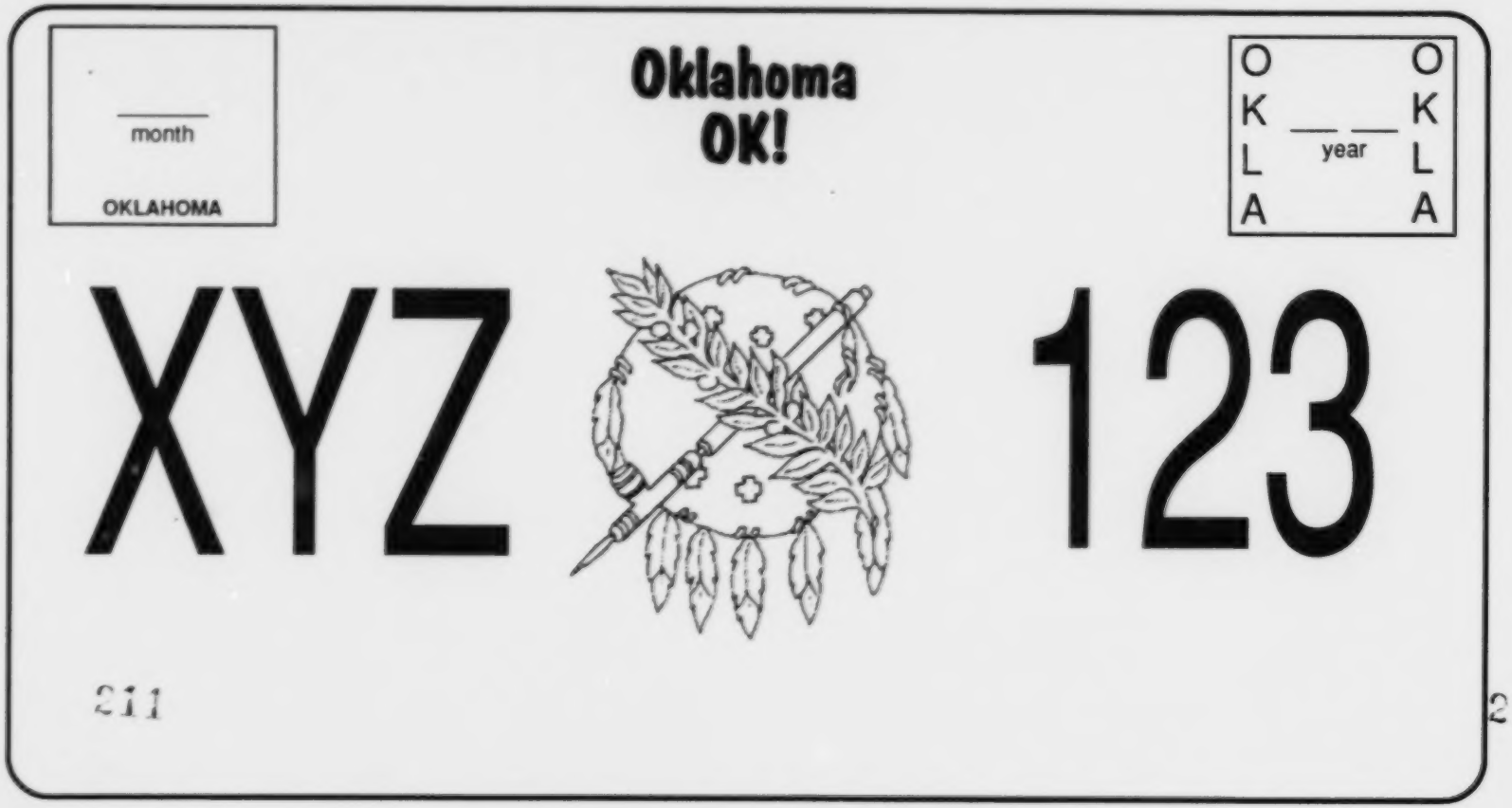
Did the student enjoy designing an "ag" license plate? Did the student follow the guidelines for creating the license plate?

E. Related Activities

1. Have each student choose a state and write to that state's transportation department to find out what the license plate for that state looks like, how it was chosen, how long the state has been using that design, etc.
2. Have students research which states have agriculture-related slogans or pictures of agricultural products on their plates.
3. Invite a representative of the Oklahoma State Transportation Department or the Oklahoma State Tourism Department to class to discuss how the design for our state's license plate was chosen, who designed it, how much it costs to make each plate, where they are made, etc. Or divide the class into fact-finding groups, and assign each group to find as much information as possible about Oklahoma's license plate.
4. Show students pictures of license plates from several different states, and have them vote on which one does the best job of making them want to visit that state.

Name_____

A License for Ag



Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Ag in the Classroom

STACK UP TO NUTRITION

SUBJECT: Visual Arts GRADE: 3-4

AGRICULTURAL TOPIC: Nutrition CONCEPT: I

STUDENT SKILL

The student will engage in creative drawing, painting, designing, sculpting, constructing, weaving and printmaking.

LEARNER OBJECTIVE

The student will construct a four-sided pyramid and be introduced to U. S. Department of Agriculture nutrition guidelines, better known as the "Food Pyramid".

LESSON

A. Step-by-Step Instructions

1. Discuss with students what they eat and why. Discuss the difference between the foods that help growing bodies grow stronger and foods composed of empty calories.
2. Copy the student worksheets on heavy paper, and hand them out to students.
3. Use student worksheets B and C to introduce the USDA Food Guide Pyramid.
4. Use the background material to discuss each section of the pyramid as a class.
5. Discuss the definition of "pyramid" as a geometric shape, then go over the instructions for constructing the pyramids.

   Section 1 - Read together the short explanation of the food pyramid. Encourage students to share this information with their parents at home.

   Section 2 - Discuss the five main food categories that form the building blocks of good eating habits, and explain that the foods that form the top of the pyramid -- "Fats, Oils and Sweets" -- are foods we should eat only occasionally. Have students name foods they like to eat from each of the categories.

   Section 3 - Have students identify the foods pictured and color them.

   Section 4 - Have students write the names of foods they like in the appropriate blocks on the food pyramid. Students may draw pictures of the foods they like or cut pictures from magazines and glue them in the spaces.
6. Have students cut out the pyramid sections, making sure to leave the tabs attached. Instruct students to fold the tabs on the dotted lines and tape or glue the sections together in the correct number order.

Student worksheets adapted from Michigan State University Extension Service

B. Background

The Food Guide Pyramid is a graphic guide to what each person needs to eat each day to stay healthy. The Food Guide Pyramid was developed by the U.S. Department of Agriculture (USDA) with the support of the U.S. Department of Health and Human Services. The guidelines are designed for healthy Americans, aged two and up.

Foods listed at the bottom of the pyramid are the foods that should form the foundation of your diet. No one of these foods is more important than another. Each kind of food provides some, but not all, the nutrients your body needs. For that reason foods in one group can't replace those in another.

Fats, oils and sweets are at the pyramid tip. It's okay to eat those foods but only occasionally and in small amounts. The symbols for fats (a solid black circle) and sugar (a black inverted triangle) are found throughout the Food Guide

Pyramid. Fat and sugar are found in many types of food and in most of the food groups.

Source: Oklahoma Cooperative Extension Service, Nutritional Sciences, OSU

C. Resources

Books

Asch, Frank, *Milk and Cookies,* Gareth Stevens, 1992.
Bourgeois, Paulette, *The Amazing Apple Book,* Addison-Wesley, 1990.
Casely, Judith, *Apple Pie and Onions,* Greenwillow, 1987.
Cosgrove, Stephen, *Muffin Muncher,* Price, Stern, Sloan, 1975.
Kovalski, Maryann, *Pizza for Breakfast,* Morrow, 1991.
Mitgutsch, Ali, *From Grain to Bread,* Carolrhoda, 1981.
Patent, Dorothy Hinshaw, *Nutrition: What's in the Food We Eat,* Holiday House, 1992.

Additional Resources

CSPI-Pyramid, Suite 300, 1875 Connecticut Ave. N.W., Washington, D.C. 20009 (six and one-half-inch food pyramid made from sturdy coated paper, rates foods within the pyramid according to which ones are better for you, $5, plastic version, $29.95).

"Dietary Guidelines for Americans," Consumer Information Center, Department 527-Y, Pueblo, CO 81009 (free).

"The Food Guide Pyramid Booklet," Consumer Information Center, Department 159-Y, Pueblo, CO 81009 (send $1 check or money order, payable to the Superintendent of Documents).

D. Evaluation

Were students able to place their favorite foods in the correct sections of the food pyramid? Did they enjoy putting the model together?

E. Related Activities

1. Make a pyramid snack. Have students invent a snack that includes foods from each food group. For example, start with an English muffin half or a firm cracker. Spread the top lightly with peanut butter. Add shredded carrots and chopped apples. Serve with milk.
2. Have each student print his or her name down the left side of a sheet of paper. Then have students select foods that begin with the letters in their names and place them in a pyramid shape.
3. Copy section 2 of the food pyramid, and hand out copies to all your students. Instruct students to write down everything they eat the following day. On the next day have students compare their food diaries against the required daily servings from the pyramid, using tallies or check marks in the appropriate spaces.

Name _____

Stack Up to Nutrition A

Color the food pictures. Cut out the pyramid along the solid line. Fold the tabs on the dotted line.

Section 1

The food pyramid was designed to help people understand what foods they should eat. The bottom six blocks of the pyramid contain most of the foods you should eat daily.

fold

The pyramid tip contains foods you should only eat every now and then.

Remember, eating right is part of having a healthy lifestyle. People with healthy lifestyles have fewer diseases and feel better.

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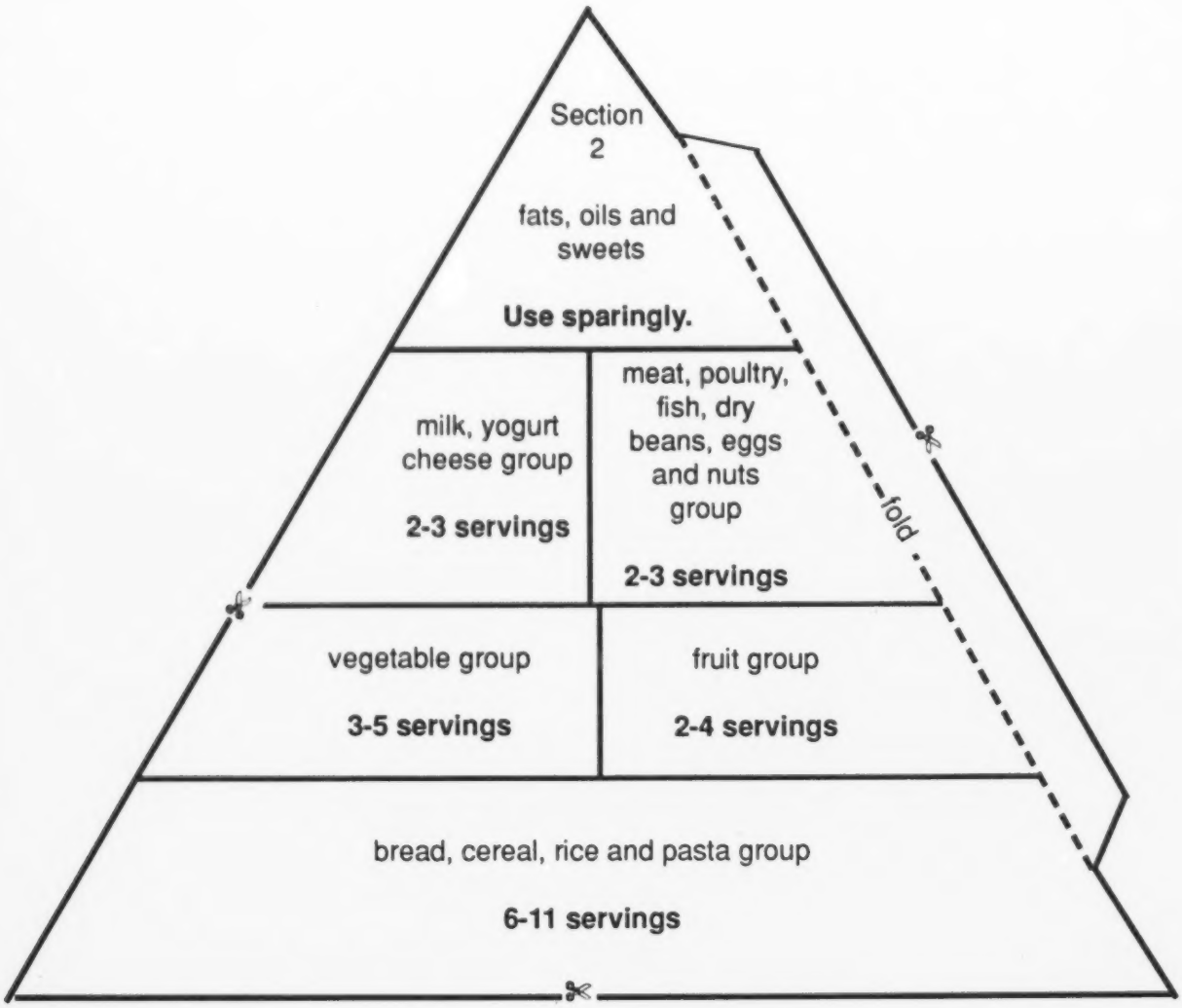
Ag in the Classroom

Name _____

Stack Up to Nutrition B

Section two shows the six building blocks that make up the food pyramid. Each block is labeled with a food group and the recommended daily serving. Tape or glue the section one tab to the back left side of section two.



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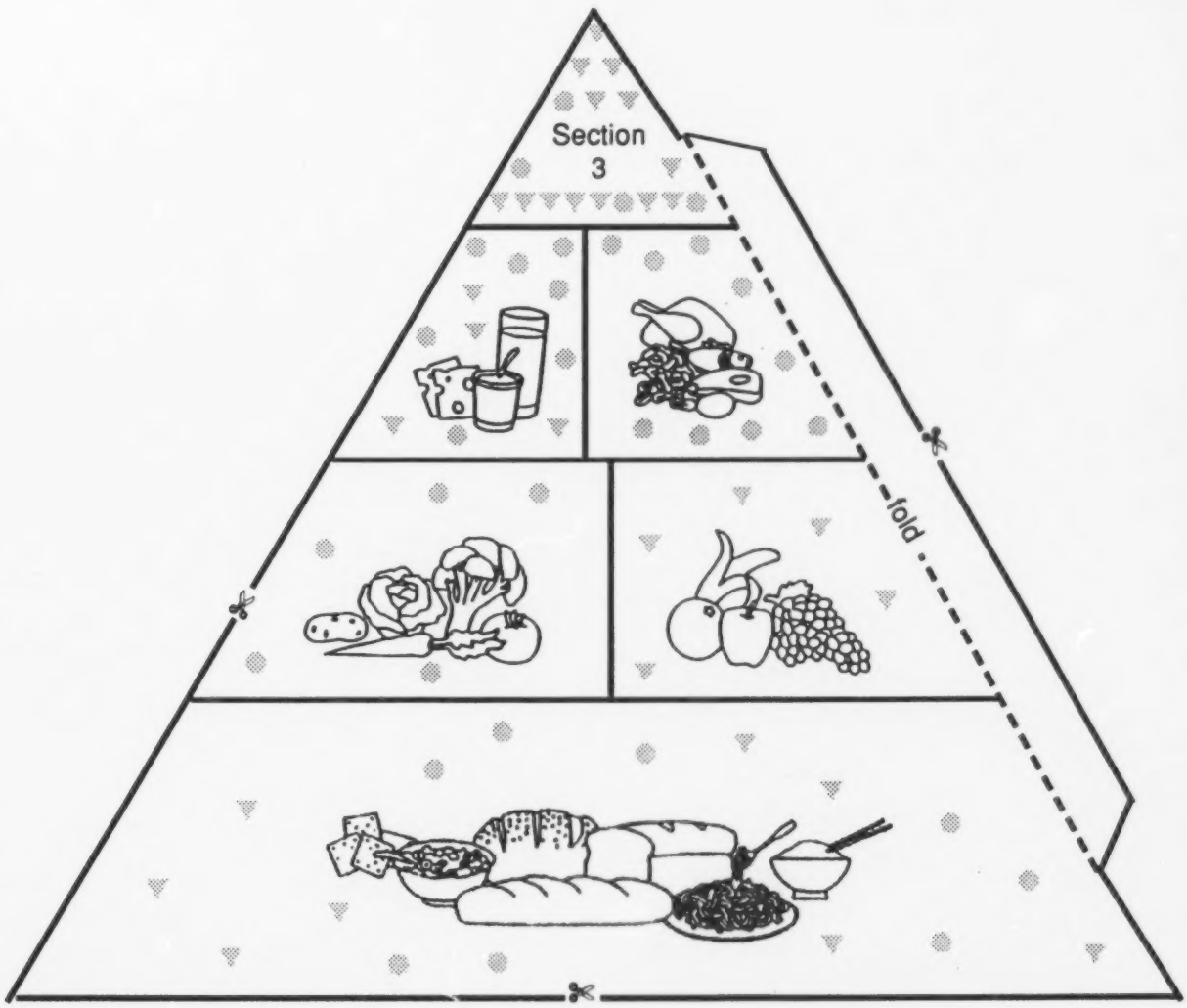
Name _____

Stack Up to Nutrition C

Section three shows a sampling of the foods that can be found in each building block. The symbol "●" stands for fats (naturally occurring and added), and the symbol "▼" stands for sugars (added). Color the food pictures. Tape or glue the tab from section two to the back left side of section three.



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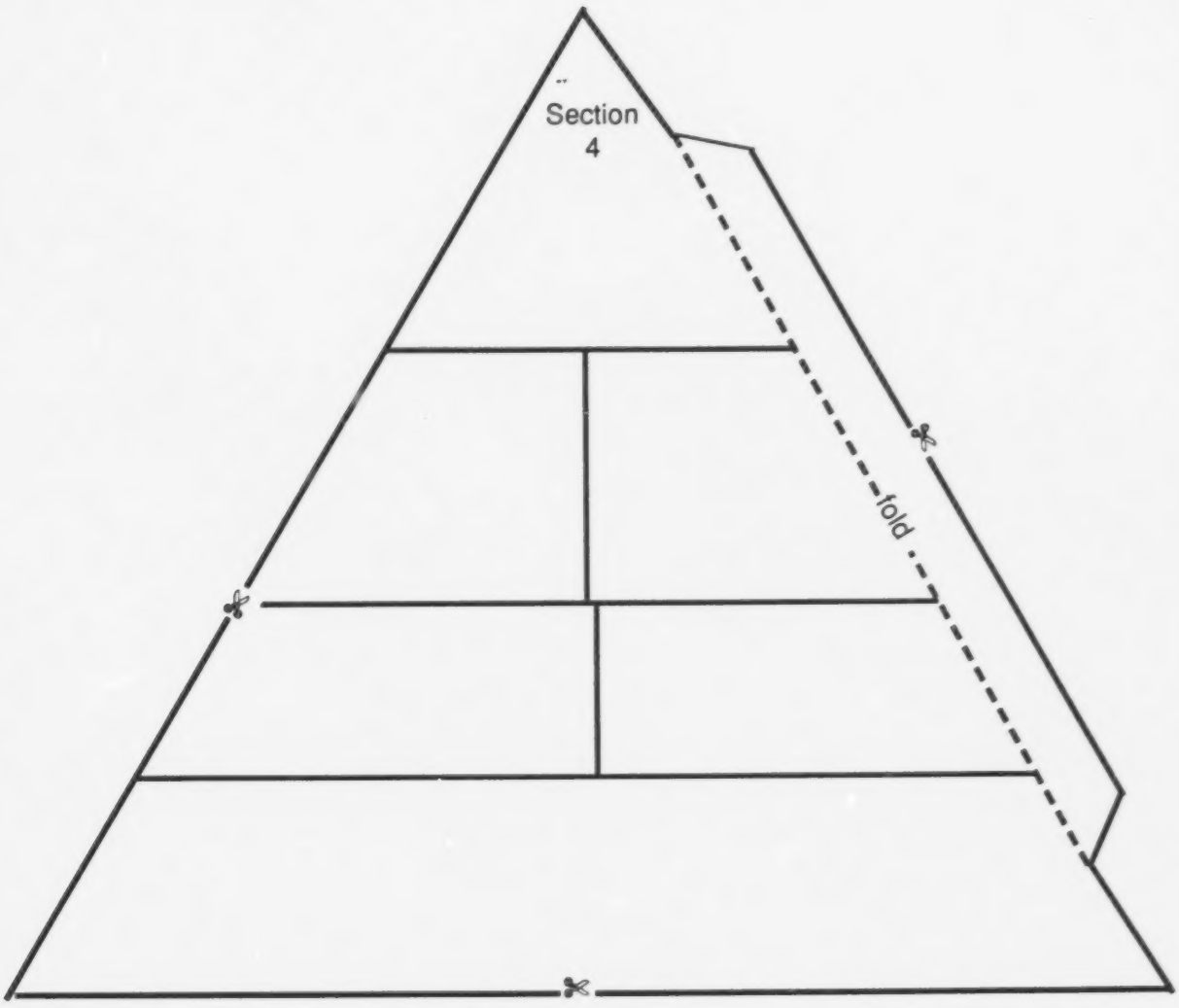
Name_____

Stack Up to Nutrition D

Design your own pyramid below, using your favorite foods to fill the blocks. Draw your own food picture, or cut pictures out of a magazine. Tape or glue the tabs on section three to the back left side of section four. Tape or glue the tab on section four to the back left side of section one.



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BEE DANCE

SUBJECT: Visual Arts **GRADE:** 3

AGRICULTURAL TOPIC: Bees **CONCEPT:** I

STUDENT SKILL
The student will identify other art forms such as music, dance and drama.

LEARNER OBJECTIVE
The student will construct bee puppets and use them to create dances like those bees use to communicate with one another.

LESSON

A. Step-by-Step Instructions

1. Share background material.
2. Have each student draw the outline of a classmate's shoe on a sheet of paper. Each student will need three outlines of the same shoe. One outline will represent the body of a bee, with the toe end serving as the stinger and the heel end serving as the bee's head.
3. Have students cross the other two outlines and glue them behind the bee's body to serve as wings. Place the toe ends of the wings toward the heel end of the body. Provide students with pictures of bees in books or magazines, and have them color their puppets to look like bees. Give each student a popsicle stick to glue to the back of his or her puppet.
4. On a nice day, bring a small jar of honey to class. Divide your class into groups of four or five, and take them outdoors. Have the groups take turns hiding the honey. Then have each group use the bee puppets they have made to act out directions for the rest of the class to follow to find the honey. Remind students that bees move in the form of a figure eight and that slow dancing means the nectar is far away and fast dancing means it is closer.

B. Background

Bees must have the help of other bees to make honey. One bee would have to make 154 trips, carrying tiny amounts of nectar from the flower to the hive, just to make one teaspoonful of honey. If one bee had to make a pound of honey all by herself she would have to spend 160,000 hours and make 80,000 trips. That would be the same as flying around the world three times. A worker bee's wings would wear out, and she would die long before she could fly that far. One worker bee actually makes only 1/12 of a teaspoon of honey in her lifetime. But working together, a colony of bees may bring in as much as 50 pounds of nectar in a day and make 200 or 300 pounds of honey in a year.

Honeybees communicate with one another through their movements. They attract the attention of other bees and let them know where to find nectar through movements that look like some kind of dance. The movements show the other bees which way to go and how far. The bees usually move in the form of a figure eight. Slow dancing means the food source, or nectar, is far away. Fast dancing means it is closer.

When one bee colony gets too crowded the bees will decide to split up and start a new colony. The workers begin to raise a new queen. When it is almost time for the new queen to hatch, the old queen will gather several thousand bees to go with her and leave. This is called swarming. When you see a swarm of bees you can be sure the queen is right in the middle. The bees fly in a circle, around and around, until the queen lands. Then the other bees land around her, clinging to

each other in a great heap. When the swarm has settled it sends out scouts to find a new home. When bees are swarming, they will not attack, because they have no home to protect.

Source: Oklahoma Cooperative Extension Service, Entomology, OSU

C. Resources

Books

Heller, Ruth, *The Reason for a Flower,* Putnam, 1992.
Holly, Brian, *Hayes Book of Bugs and Critters,* Hayes, 1985.
Lord, John, and Jane Burroway, *Giant Jam Sandwich,* Houghton-Mifflin, 1972.
Ryder, Joanne, *Dancers in the Garden,* Sierra, 1992.

Additional Resources

"What's Buzzin'," National Honey Board, Attn: Mary Humann, 421 21st Ave., Ste. 203, Longmont, CO 80501-1421 (free educational kit for students in grades 4-6, includes videotape, worksheets, poster and teacher's guide).

D. Evaluation

Did students enjoy making the puppets and performing the bee dances? Do students understand how bees communicate with one another?

E. Related Activities

1. Have students use their puppets to act like bees swarming. Designate one student the "queen bee," and have the other students swarm around the queen until he or she decides to "land." Then have the "bee colony" send out scouts to find a good place for a hive.
2. Have students write their own play, depicting a colony of bees swarming, from the time they decide to divide to the time the new colony finds a new home.
3. Have a water relay to help students understand how much work it takes for a bee to gather enough nectar to make honey. Students should use teaspoons or eye droppers to transfer one cup of water from one container to another one some distance away. Use a stopwatch to keep accurate time. To add suspense to the relay, play a recording of Rimski-Korsakov's "Flight of the Bumblebee" as the students race.

NATURE'S COLORS

SUBJECT: Visual Arts GRADE: 4

AGRICULTURAL TOPIC: Horticulture CONCEPT: III

STUDENT SKILL

The student will discuss observations of visual and expressive features seen in the environment (such as colors, textures, shapes, etc.).

LEARNER OBJECTIVE

The students will learn to make dyes from common plants.

LESSON

A. Step-by-Step Instructions

1. Share background material.
2. Bring several cooking pots and a variety of plant material to class for making natural dyes. Use the chart on the following page to determine which plants produce which colors.
3. Place a handful of the plant material and two cups of cold water in each pan. For brighter colors, place copper pennies in the dye baths. Place each pan over a heat source, and bring the liquid to a rapid boil. Simmer for 10 minutes, then turn off the heat. Cover the pans, and steep the mixture for 30 minutes. Strain the dyes to remove residues. Dyes can be placed in sealed containers and refrigerated for later use.
4. Provide each student with a 12-inch square of unbleached muslin which has been laundered and dried without fabric softener. Have each student choose a color and place his or her cloth in the appropriate dye bath. Let the cloths soak overnight. Then have students remove them, and hang them to dry.
5. Have students sew or glue their dyed cloth squares together to create a natural wall hanging to display in the hallway.

B. Background

We use plant materials for many things -- food, clothing and shelter. Until the mid-1800s, people also depended on plants for the colors that brightened their world.

Aboriginal people in Britain colored their skin with blue dye made from the leaves of the woad plant. The ancient Egyptians collected indigo flowers to make blue dye and madder root to make red. They also collected the ***stigma*** *of saffron flowers to make yellow dye. To make just one ounce of yellow dye, they had to gather 4,000 saffron stigma. Later safflower was substituted for saffron to make yellow dye.*

Until the 1800s dyes from vegetable sources were nearly as important as spices. In 1856 an Englishman named William Perkin developed a dye from coal tar. After that many people stopped using natural dyes, because making dye from coal and, later, petroleum products, was cheaper and easier. ***Synthetic*** *dyes also last longer. Natural dyes wash out and fade easily.* ***Mordants****, such as alum, chrome, iron, tin, vinegar, ammonia or lime, can fix natural dyes to make them last longer.*

Source: Oklahoma Cooperative Extension Service, Horticulture and Landscape Architecture, OSU

C. Resources

Agee, Jon, *Incredible Painting of Felix Clousseau,* Farrar, Strauss and Giroux, 1988.
Amor, Jennifer, *Flavor Quilts for Kids to Make,* American Quilter's Society, 1991.
DePaola, Tomie, *Legend of the Indian Paintbrush,* Putnam, 1991.
Gardiner, James, *Top Secret,* Bantam, 1987.

D. Evaluation

Did the students enjoy dyeing pieces of cloth? Did they experiment with more than one dye?

E. Related Activities

1. Lead a discussion on the importance of color in the products we buy. Bring products with and without color to class (shampoo, soft drinks, dish soap, etc.) Ask students why some manufacturers have stopped using color in their products (skin allergies, etc.)
2. Have students dye a variety of fabrics -- cotton, linen, wool, polyester -- and observe differences in how each fabric takes the dye.
3. Leave material in the dyes for different lengths of time. Keep a log of the amount of time each piece is left in the dye. Allow time for the material to dry. Have students label each piece of cloth according to how long it was immersed in the liquid, and create a display.
4. Have students use their natural dyes for dying eggs or as paint on paper.
5. Bring old garden magazines and catalogues to class, and have students cut out pictures of plants to form a color wheel (a color wheel page is located in the pattern page section of the book). Have students look for flowers that are described as "blue" and discuss whether they are really blue or not. Ask which colors are easiest to find in nature and which are most rare.

Nature's Colors

Natural Dye Material	Colors Produced
walnut shells	buff or adobe
red cabbage	blue
orange peel	light yellow
carrot tops	light yellow to green
fresh cranberries	dark green
onion skins	orange
spinach	light yellow
marigold petals	pale yellow
crushed fresh juniper berries	yellow
parsley	cream

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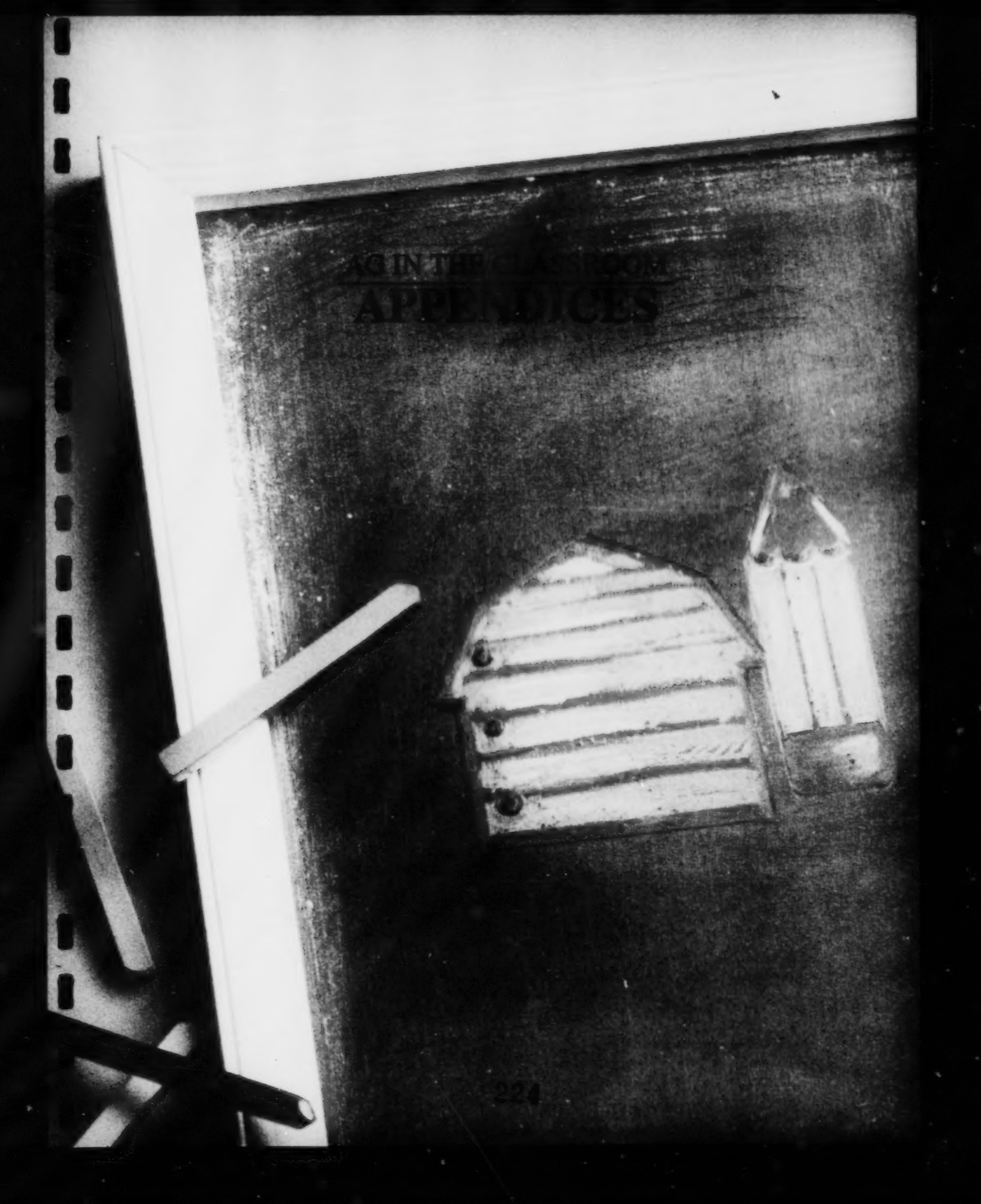
AG IN THE
APPENDICES

Glossary

The following terms are used in the 3-4 lessons. While many of the terms may have additional definitions, those given most closely and simply define the way the word is used in the lessons.

abdomen - The large rear part of the body of an arthropod.
abomasum - The part of the stomach in ruminant animals where true digestion takes place.
ag - A short term used in place of the word "agriculture."
agribusiness - The production, processing and distribution of farm products and the manufacture of farm machinery, equipment and supplies.
agriculture - The science, art and business of cultivating the soil, producing crops and raising livestock.
alfalfa - A plant native to Europe, cultivated for grazing or for feeding to livestock as hay.
amino acid - An essential component of the protein molecule.
angora - The silky hair of the Angora goat or rabbit used to make yarn or fabric.
Angus - A breed of cattle originating in Scotland, having no horns and black or dark red coats.
animal husbandry - The care and breeding of domestic animals such as cattle, hogs, sheep and horses.
antennae - Flexible, jointed sensory appendages in the head of an insect, myriapod or crustacean.
aquaculture - Fish farming.
arable - Land that is fit for cultivation.
arachnida - Any of various arthropods having four pairs of legs (spiders, scorpions, mites, ticks).
arthropod - Any of numerous invertebrate organisms, including insects, crustaceans, arachnids and myriapods, having a horny, segmented external covering and jointed limbs.
bacon - Meat from the back and sides of a pig that has been smoked and salted.
bacteria - A widely-distributed group of typically one-celled microorganisms, many of which produce diseases. Many are active in processes of fermentation, the conversion of dead organic matter into soluble food for plants and the fixing of atmospheric nitrogen.
baling wire - Wire used to hold together square bales of some types of cut grass or straw.
barbed wire - Twisted strands of fence wire having sharp barbs at regular intervals.
barley - A cereal grass grown for animal feed in the Oklahoma Panhandle.
barren - Not producing; lacking vegetation; fruitless.
barter - To trade goods or services without the exchange of money as payment.
bedrock - The solid rock that underlies all soil, sand, clay, gravel and loose material on the earth's surface.
beeswax - The yellowish to dark-brown wax secreted by the honeybee for making honeycombs.
bell pepper - The bell-shaped fruit of the bell pepper plant.
belladonna - A poisonous plant native to parts of Europe and Asia.
beneficial insect - Insects considered helpful to the farmer or gardener because they aid pollination (bees, butterflies) or help control harmful insects (lady beetles, dragonflies).
billy goat - A male goat.
bison - A hoofed mammal of western North America, having a dark-brown coat, a shaggy mane and short, curved horns.
boar - An uncastrated male pig.
bollworms - The large, very destructive larva of a kind of moth, also called "corn earworm," because it is harmful to growing corn as well as cotton and other growing plants.
bolt - A large roll of cloth of a definite length, as it comes from the loom.
Brahman cattle - A breed of cattle developed in the southern United States from stock originating in India having a hump between the shoulders and a large fold of loose skin hanging from the neck.
branch - A secondary woody stem or limb growing from the trunk or main stem of a tree, bush or shrub or from another secondary limb.
brand - A mark indicating identity or ownership, burned, tattooed or painted on an animal's coat or hide.
branding iron - A metal rod heated and used for branding.
breed - To develop new or improved strains in animals or plants.
bristle - A short, coarse, stiff hair or hairlike part.
broiler chicken - A tender young chicken suitable for broiling.
brown rice - Unpolished rice, retaining the germ and the yellowish outer layer containing the bran.

buck - Adult male goat.
bull - Adult male bovine mammal.
caballero - A Spanish gentleman skilled in riding and managing horses.
calcium - A metallic element which is one of the basic components of bone, shells and leaves.
candling - To examine an egg for freshness in front of a light.
cantaloupe - A variety of melon having fruit with a ribbed, rough rind and aromatic orange flesh.
carbohydrates - A group of chemical compounds that include sugars, starches and cellulose.
carbon dioxide - A colorless, odorless, incombustible gas formed during respiration, combustion and organic decomposition.
carrot - A widely cultivated plant having finely divided leaves, flat clusters of small white flowers and an edible, yellow-orange root.
cashmere - Fine, downy wool growing beneath the outer hair of the Cashmere goat that can be spun into a soft fabric.
cattle rustler - A person who steals cattle.
celery seed - The seed of a plant native to Eurasia used as a seasoning and suitable for sprouting.
cell - A small enclosed cavity or space, such as a compartment in a honeycomb.
cereal - An edible grain, such as wheat, oats or corn.
chaff - The husks of grains and grasses separated from the seed by thrashing.
chick - A young chicken.
chick mash - A dry food which supplies all the needed protein and vitamins for the development of a healthy chick.
chilopoda - Any of various arthropods, including the centipede.
cow chip - A fragment of dried cow dung, sometimes used as fuel.
chlorine - A highly irritating, greenish-yellow gaseous halogen, widely used in purifying water, as a disinfectant and as a bleaching agent.
chop - A cut of meat, usually taken from the rib, shoulder or loin, and containing bone.
clay - A fine-grained, firm soil widely used in making bricks, tiles and pottery.
climate - The meteorological conditions, including temperature, precipitation and wind, that characteristically prevail in a particular geographic area.
clover - A common leguminous plant valuable as a forage plant for livestock.
cockerel - A young rooster.
colony - A group of the same kind of animals, plants or one-celled organisms living or growing together.
combine - A power-operated harvesting machine that cuts, thrashes and cleans grain.
compost - A mixture of decaying organic matter, such as leaves and manure, used as fertilizer.
conservation - The controlled use and systematic protection of natural resources, such as soil, waterways and forests.
cooperative - An enterprise owned jointly by those who use its facilities or services.
corn - Any of several varieties of a tall, widely cultivated cereal plant bearing seeds or kernels suitable for eating on large ears.
cotton - Any of a variety of plants or shrubs cultivated in warm climates for the soft, white, downy fiber surrounding the seeds, used in making textiles and other products.
cotton boll - The rounded seed pod or capsule of the cotton plant.
cotton gin - A machine that separates the seeds, seed hulls and other small objects from cotton fibers.
cotton lint - The mass of soft fibers surrounding the seeds of unginned cotton.
cotyledon - The first, or one of the first, leaves of a plant embryo to appear from a sprouting seed.
county agricultural agent - Government agent responsible at the local level for sharing current agricultural information drawn from agricultural research schools.
crop - Cultivated plants or agricultural produce, such as grain, vegetables or fruit.
crop rotation - A method of maintaining and renewing the fertility of the soil by alternating the crops grown on one piece of land from one year to the next.
crown - The upper part of a tree, including the leaves and living branches.
crustacea - Any of various predominantly aquatic arthropods, including lobsters, crabs, shrimps, barnacles and crawdads, characteristically having a segmented body, a semitransparent, horny exoskeleton and paired jointed limbs.

cud - Food regurgitated from the first stomach to the mouth of a ruminant animal and chewed again.
cut - A part severed from the main body, as in a cut of meat.
cycle - A time interval in which a regularly repeated event or sequence of events occurs.
decay - The destruction of or decomposition of organic matter as a result of bacterial or fungal action.
deciduous - Shedding or losing foliage at the end of a growing season.
decomposition - Organic decay.
decomposers - Organisms which break materials down into parts and cause them to rot.
digest - To transform food into an assimilable condition, as by chemical and muscular action in the alimentary canal.
dill seed - The seeds of an aromatic herb native to the Old World. The leaves and seeds of the dill plant are used as a seasoning and are suitable for sprouting.
diplopods - Any of various segmented, cylindrical arthropods, including the millipedes.
doe - A female goat.
domesticate - To train or adapt a plant or animal to live in a human environment and to be of use to humans.
dormancy - In a relatively inactive or resting condition in which some processes are slowed down or suspended.
drone - A male honeybee, characteristically stingless, which performs no work and produces no honey.
drought-resistant - The adaptations that enable plants to survive under drought conditions.
dung - Manure; the excrement of animals.
earthworm - Any of various worms that burrow into and help aerate and enrich the soil.
ecology - The relationships between organisms and their environments.
embryo - An organism in its early stages of development, before it has reached a distinctively recognizable form.
erode - To wear away by wind, water or other forms of abrasion.
excrete - To eliminate waste matter from the blood, tissues or organs.
exoskeleton - The external protective or supporting structure of many invertebrates, such as insects or crustaceans.
export - To send or carry a commodity abroad for sale or trade.
fertile - Rich in the material needed to support life.
fiber - A natural or synthetic filament, as of cotton, wool or nylon, capable of being spun into yarn.
flock - A group of animals that live, travel or feed together.
fodder - Feed for livestock, often consisting of coarsely chopped stalks and leaves of corn mixed with hay.
foliage - A cluster of leaves.
food - Materials, usually of plant or animal origin, containing or consisting of essential body nutrients that is taken in and assimilated by an organism to maintain life and grow.
forage - Food for domestic animals.
forcing - To cause to grow by artificially accelerating the normal processes.
forest - A dense growth of trees and other plants covering a large area.
forestry - The science and art of cultivating, maintaining and developing forests.
free-range - Animals or fowl that are free to roam about looking for food to sustain life.
fryer chicken - A small young chicken suitable for frying.
fungicide - A substance that destroys or inhibits the growth of fungi.
fungus - Any of numerous plants lacking in chlorophyll, including yeasts, molds and mushrooms.
genealogy - A record or table of the descent of a family, group or person from ancestor or ancestors.
germinate - To begin to grow; sprout.
gobbler - A male turkey.
goods - Articles of trade or commerce, especially agricultural products that can be transported.
grain - A small hard seed or fruit produced by a cereal grass.
grain drill - A machine or implement for planting seeds in holes or furrows.
grazing - To put livestock out to feed on growing grasses or herbage.
gumbo - A soup or stew thickened with okra.
habitat - The area or type of environment in which an organism or biological population normally lives or occurs.

hackberry - Any of various trees or shrubs having inconspicuous flowers and berrylike, often edible, fruit.
harvest - The act or process of gathering in a ripened crop at the end of a growing season.
hatchery - A place where eggs, especially those of fish or poultry, are hatched.
hay - Grass or other plants, such as clover or alfalfa, cut and dried for animals to eat.
heifer - A young cow that has not given birth to a calf.
hen - Adult female of domestic fowl.
herd - A group of cattle or other domestic animals of a single kind that are kept together for a specific use.
Hereford - Any of a breed of beef cattle developed in Herefordshire, England, having a reddish coat with white markings.
hexagon - A polygon having six sides.
hibernation - To pass the winter in a dormant or inactive state.
hickory - Any of several, chiefly North American, deciduous trees, having smooth or shaggy bark, compound leaves and hard, smooth nuts with an edible kernel.
hive - A structure for housing bees.
hog - A domesticated pig weighing over 120 pounds.
Homestead Act - An act passed by Congress in 1862 promising ownership of a 160-acre tract of public land to a head of a family after he or she had cleared and improved the land and had lived on it for five years.
honey - A sweet yellowish or brownish sticky fluid produced by various bees from the nectar of flowers and used as food.
honeycomb - A structure of hexagonal, thin-walled cells constructed from beeswax by honeybees to hold honey and eggs.
hue - A particular color, as distinct from other colors; shade.
humus - A brown or black organic substance consisting of partially and wholly decayed vegetable matter that provides nutrients for plants and increases the ability of soil to retain water.
hypothesis - An explanation that accounts for a certain set of facts and that can be tested by further investigation.
import - To bring in or carry in from an outside source, to bring in goods from a foreign country for sale or trade.
incubator - A temperature-controlled enclosure for hatching eggs artificially.
integrated pest management - A system of pest management aimed at reducing agricultural losses caused by pests using methods that cause minimal environmental damage and little or no health risk.
ingredient - Something that is an element in a mixture or compound.
inorganic - Not arising in normal growth; artificial.
insect - Any number of small invertebrate animals having an adult stage characterized by three pairs of legs, a segmented body with three major divisions and usually two pairs of wings.
invertebrate - An animal that has no backbone or spinal column.
iron - A metallic element essential to healthy blood and available to humans through consumption of such foods as red meat, spinach, beets, whole wheat and raisins.
labor-intensive - Requiring large numbers of laborers and labor hours.
lanolin - A yellowish-white fatty substance obtained from wool and used in soaps, cosmetic, and ointments.
lard - The white solid or semi-solid rendered fat of a hog.
larvae - The wingless, often worm-like, form of a newly hatched insect before it undergoes metamorphosis.
layer - One that lays or produces eggs; a hen.
lean - Containing little or no fat.
leaves - Usually green, flattened structures of vascular plants, characteristically consisting of bladelike expansions attached to a stem and functioning as principal organs of photosynthesis and transpiration.
lentils - The edible seeds of a leguminous plant native to the Old World, suitable for sprouting.
lichens - Any of numerous plants characteristically forming a crust-like, scaly, or branching growth on rocks or tree trunks.
Light Brahma - A breed of chicken that can be raised for commercial use or for the purpose of showing.
lint - The mass of soft fibers surrounding the seeds of unginned cotton; fuzz.
litter - The young produced at birth by mammals which characteristically give birth to more than one offspring at a time.

loam - Soil consisting mainly of sand, clay, silt and organic matter.
loblolly pine - A pine tree of the southeastern United States, having strong wood used as lumber and for paper pulp.
loom - A machine or device in which cloth is produced by interweaving thread or yarn at right angles.
McCormick reaper - The first mechanical reaper developed by Cyrus McCormick in 1831. The first reapers cut sheaves of grain and lay them on the ground. Later versions of the machine reaped (cut) and tied the sheaves of grain in one operation.
mandrake - A Eurasian plant with purplish flowers and a branched root thought to resemble the human body used in dyes.
manure - Animal dung, compost or other material used to fertilize soil.
maverick - An unbranded or orphaned range calf or colt, traditionally considered the property of the first person who brands it; a horse or steer that has escaped from the herd.
Mesonet - A statewide environmental monitoring network developed to place timely and highly useful weather information in the hands of the citizens of Oklahoma.
mill - A building quipped with machinery for grinding grain into flour or meal.
millet - A grass cultivated in Eurasia for its seed and in North America for hay.
mineral - A substance that is neither animal nor vegetable, inorganic matter.
miso - A paste used for soup stock made with fermented soybeans and rice.
mohair - The hair of an Angora goat or rabbit used to make yarns and fabrics.
molting - To shed an outer covering, such as feathers or skin, which is replaced by new growth.
mordant - A substance used to fix colors in the dyeing process.
mortar - A vessel in which substances are crushed or ground with a pestle.
mud - Wet, sticky, soft earth.
mule - A sterile hybrid of a male ass and a female horse.
mung bean - The seed of a plant grown in Oklahoma for use as animal feed and eaten most often by humans in the form of bean sprouts.
muscle - A tissue composed of fibers capable of contracting and relaxing to effect bodily movement.
muskmelon - Any of several varieties of the melon, such as the cantaloupe, having fruit characterized by a pitted rind and flesh with a musky aroma.
muslin - Any of various sturdy, plain-weave cotton fabrics, used especially for sheets.
mustard seed - The pungent seeds of a plant native to Eurasia used in making a condiment, suitable for sprouting.
myriapod - Any of several arthropods, such as the centipede, having segmented bodies and many legs.
nanny - A female goat.
nectar - A sweet liquid secreted by flowers of various plants and gathered by bees for making honey.
negative - An image in which the light areas of an object appear dark, and the dark areas appear light.
niacin - A vitamin B complex occurring in living cells as an essential substance for growth.
notching - Cutting a V-shape in the ear of a swine to indicate its litter or number in litter.
nurse - To take nourishment from the breast; suckle.
nutrient cycle - The process by which nutrients move from one stage of the life cycle to the next.
nutrients - Substances necessary for life and growth.
oats - A grass widely cultivated for its edible seed.
okra - A tropical or semitropical plant commonly grown in Oklahoma gardens having edible, mucilaginous green pods.
omasum - The third stomach of a ruminant animal, located between the abomasum and the reticulum.
organic - Of, pertaining to, or derived from living organisms.
organism - A living individual, plant or animal.
parsley - A cultivated herb, having much-divided, curled leaves that are used as a garnish and for seasoning.
particles - A very small piece or part; speck.
pea - A climbing annual vine, cultivated in all temperate zones, and having compound leaves, small white flowers and edible seeds in a green, elongated pod.
peanut - A vine native to tropical America and widely cultivated in semitropical regions, having yellow flowers on stalks that bend over so the seed pods can ripen underground. Cultivated for its edible seeds.

peat - Partially carbonized vegetable matter, usually mosses, found in bogs and used as fertilizer and fuel.
pecan - A tree of the southern United States, having deeply furrowed bark and edible nuts.
pen - A fenced enclosure for animals.
pesticide - A chemical used to kill pests, such as insects and rodents.
pest - An injurious plant or animal; one that is harmful.
pestle - A club-shaped hand tool for grinding or mashing substances in a mortar.
phyla - A division of the animal kingdom or, less commonly, the plant kingdom, next above a class in size.
pig - Any of several mammals, having short legs, cloven hooves, bristly hair and a hard snout used for digging.
pith - The soft spongelike substance in the center of the stems and branches of most vascular plants.
plow - A farm implement consisting of a heavy blade at the end of a beam, usually hitched to a draft team or motor vehicle and used for breaking up soil and cutting furrows in preparation for sowing seeds.
Plymouth Rock - A breed of chicken used commercially or for show purposes.
poll - To cut off or to cut short the horns of an animal.
pollen - The fine powderlike material produced by the anthers of flowering plants and functioning as the male element in fertilization.
pollinated - To convey or transfer pollen from an anther to a stigma of a plant or flower in the process of fertilization.
pork - The flesh of a pig or hog used as food.
positive - The photographic image in which the lights and darks appear as they do in nature.
prairie - An extensive area of flat or rolling grassland, especially the plains of North Central America.
precipitation - Water droplets or ice particles, such as rain or snow, which are condensed from atmospheric water vapor and fall to the earth's surface.
predators - Animals that lives by preying on others.
predict - To state, tell about, or make known in advance; to do so on the basis of special knowledge.
prefabricated - Constructed in standard sections that can be easily shipped and assembled.
processing plant - A place where a specific type of food is prepared and converted by special treatment into an end product.
protein - Any of a group of complex nitrogenous organic compounds that occur in all living matter and are essential for the growth and repair of animal tissue.
pumpkin - The large, pulpy round fruit of a vine, having a thick, orange-yellow rind and numerous seeds.
queen bee - The fertile, fully developed female in a colony of social bees.
radicle - The part of the plant embryo that develops into the primary root.
range-feed - Allow (livestock) to graze and wander at will over an extensive area of open land.
razorback - A semiwild hog of the southeastern United States, having a narrow body with a ridged back.
RDA (recommended daily allowance) - The daily intake of vitamins and minerals humans require for good health, according to the U. S. Department of Agriculture.
recipe - A set of directions with a list of ingredients for making or preparing food.
regurgitate - To cast up partially digested food.
resources - Available assets.
reticulum - The second compartment of the stomach of a ruminant mammal, lined with a membrane having honeycombed ridges.
Rhode Island Red - Any of an American breed of domestic fowl having dark reddish-brown feathers.
riboflavin - A crystalline orange-yellow pigment,the principal growth-promoting factor in the vitamin B complex, found in milk, leafy vegetables, fresh meat and egg yolks.
rib - A cut of meat enclosing one or more ribs.
rooster - The adult male of the common domestic fowl.
root - The usually underground portion of a plant that serves as support, draws food and water from the surrounding soil and stores food.
rumen - The first division of the stomach of a ruminant animal, in which food is partly digested before being regurgitated for further chewing.
ruminant - Any of various hoofed, even-toed, usually horned mammals, such as cattle, sheep, goats, deer and giraffes, characteristically having a stomach divided into four compartments and chewing a cud consisting of regurgitated, partially digested food.

runt - An undersized animal; the smallest of the litter.
rural - Of or pertaining to people who live in the country or relating to farming; agricultural.
rye - A widely cultivated cereal grass whose seeds are valued as grain and used to make flour or to feed livestock.
sand - Loose, granular, gritty particles of worn or disintegrated rock that is finer than gravel and coarser than dust.
sausage - Finely chopped and seasoned meat, usually pork, stuffed into prepared animal intestines or other casings and cooked or cured.
scarecrow - A crude figure of a person set up in a field to scare birds away from growing crops.
seed - A fertilized and ripened plant ovule containing an embryo capable of germinating to produce a new plant.
seed coat - The outer protective covering of a seed.
seedling - A young plant that has grown from a seed.
shear - To remove fleece or hair by cutting or clipping.
silt - A sedimentary material consisting of fine mineral particles intermediate in size between sand and clay.
sine cera - Without wax.
sire - The male parent of an animal.
snort - A rough noisy sound made by breathing forcefully through the nostrils, as a horse or pig does.
snout - The projecting nose, jaws, or anterior facial part of an animal's muzzle.
sod - A section of grass-covered surface soil held together by matted roots; turf.
sod house - A house often found on the American prairies during the settlement of the West, made of bricks cut from sod.
soil - The top layer of the earth's surface.
sorghum - An Old World grass, several varieties of which are widely cultivated as grain and forage or as a source of syrup.
sow - An adult female hog.
soybeans - A leguminous Asiatic plant, widely cultivated for forage and soil improvement and for its nutritious edible seeds.
species - A class of individuals or objects grouped by virtue of their common attributes and assigned a common name.
square - The flower bud of a mature cotton plant.
squeal - To utter or produce a high pitched sound; shrill cry.
standard food - A food that is made from ingredients that do not vary, such as jelly, jam and ketchup.
starches - A naturally abundant nutrient carbohydrate, found chiefly in the seeds, fruits, tubers, roots, and stem pith of plants, notably in corn, potatoes, wheat, and rice.
steer - A young ox castrated before sexual maturity and raised for beef.
subsoil - The layer or bed of earth beneath the surface soil.
sucrose - A crystalline carbohydrate found in many plants, mainly sugarcane and sugar beets, and used widely as a sweetener, preservative and in the manufacture of plastics and cellulose.
sunflower - Any of several plants having tall, coarse stems and large yellow-rayed flowers that produce edible seeds rich in oil.
swarm - A group of bees surrounding a queen bee in migration to establish a new colony.
swine - Any of the family of mammals which includes pigs, hogs and boars.
tagging - The act of attaching a strip of leather, paper, metal or plastic to identify, classify or label something.
tattoo - A permanent mark or design made on the skin by a process of pricking and ingraining an indelible pigment or by raising scars.
temperature - The degree of hotness or coldness of a body or the environment.
textile - Fiber or yarn for weaving or knitting into fabric.
thiamin - A B-complex vitamin, produced synthetically and occurring naturally in the bran coat of grains, in yeast and in meat, that is necessary for carbohydrate metabolism, maintenance of normal neural activity, and in the prevention of beriberi.
threshing machine - A farm machine used in threshing out grain or seed plants.
tofu - Soybean curd.

tomato - A plant native to South America, widely cultivated for its edible, fleshy, usually red fruit.
topsoil - The surface layer of soil.
tractor - A vehicle, powered by gasoline or a diesel motor, having large, heavily treaded tires, and used in farming for pulling machinery.
trade - The business of buying and selling commodities; commerce.
transplant - To transfer from one place to another; to uproot and replant a growing plant.
trunk - The main woody axis of a tree.
twig - A small branch or slender shoot, as of a tree or shrub.
unbleached - Not bleached.
understory - The layer of decomposed and decomposing leaves of the forest floor.
valve - A membranous structure in a hollow organ or passage, as in an artery or vein, that retards or prevents the return flow of a bodily fluid.
vegetation - The plants of an area or a region.
venom - A poisonous secretion of an animal, such as a snake, spider or scorpion, usually transmitted by a bite or sting.
veterinarian - A person trained and authorized to treat animals medically.
viable - Capable of living, developing or germinating under favorable conditions.
vitamin A - A vitamin or a mixture of vitamins, occurring principally in fish liver oils and some yellow and dark-green vegetables, functioning in normal cell growth and development and responsible, in deficiency, for hardening and roughening of the skin, night blindness and degeneration of mucous membranes.
vitamin C - Ascorbic acid.
wheat - Any of various cereal grasses widely cultivated for its commercially important edible grain; the grain of a wheat plant is ground to produce flour used in breadstuffs and pasta products such as spaghetti and macaroni.
White Leghorn - A breed of fowl that is raised for commercial use or for show purposes.
windmill - A mill or other machine that runs off the energy generated by a wheel of adjustable blades or slats rotated by the wind.
worm castings - Material cast off by worms in the digestion process.
wormlets - New-born worms.
yam - Any of various chiefly tropical vines many of which have an edible tuberous root with reddish flesh.
zebu - A domesticated bovine mammal of Asia and Africa, having a prominent hump on the back and a large fold of loose skin hanging from the neck.

Suggestions for Requesting Information and Assistance

Be specific.

Your chances of obtaining information will be greatly increased if you state exactly what you need, which issues interest you or what questions you need answered.

Avoid class-wide requests.

Avoid assigning projects to students where numerous individual requests might be made. If you cannot avoid a situation where many students ask for similar information, send all the requests together, and ask that the replay be returned in one envelope for the total group.

Request only what you need—

—and use what you get.

Try local sources.

Many community and regional agencies, organizations, associations and individuals can provide valuable information and assistance, particularly on local issues and conditions. Visit both your school library and public library for more information.

Send a self-addressed, stamped envelope.

Most agencies, both private and public, operate on limited budgets. When making a request, send along a self-addressed, stamped envelope. Many times this will bring a quicker reply.

Plan on a two- to three-week lead time.

If you plan to use a pamphlet or poster in conjunction with an activity, send your request at least two or three weeks early. If you plan to use a video or film, you may need to reserve it even earlier.

Make speaker requests well in advance.

Most agencies and volunteer organizations cannot afford to send their staff or members great distances to speak to small groups or one class. However, they may send personnel to meet groups on field trips near their offices or field stations. Generally presentations in the field allow for more hands-on activity and are superior to a formal speech in the classroom.

Remember to say thanks.

Letters of thanks that say how materials were used or how a visit enhanced the learning process can help influence future availability of resources.

Resources

Books

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Wilder, Laura Ingalls, *Little House in the Big Woods,* Harper Collins, 1961.
Wilder, Laura Ingalls, *Little House on the Prairie,* Harper Collins, 1981.
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Wilder, Laura Ingalls, *Long Winter,* Harper Collins, 1981.
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Williams, Sherley Anna, *Working Cotton,* Harcourt, Brace, Jovanovich, 1992.
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Yolen, Jane, *Letting Swift River Go,* Little, 1992.
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Ziefert, Harriet, *A New Coat For Anna,* Knopf, 1986.

Ziefert, Harriet, *Egg-Drop Day*, Little, 1988.
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Additional Resources

Agriculture Council of America, 1625 Eye St. NW, Ste. 708, Washington, DC, 20006, (202)682-9200. (Write for a list of educational material.)
Agricultural History Society, 550 12th St. SW, Room 140, Washington, DC, 20250.
Ag in the Classroom, U.S. Department of Agriculture, Administration Building, Room 318A, Washington, DC 20250 (15-minute video portrays agriculture's connection with lives across the nation. Free on loan).
Ag in the Classroom Notes (free bimonthly newsletter).
AIMS, PO Box 8120, Fresno, CA 93747.
"Magic of Water" and "Water Precious Water" (hands-on activities and teacher's guides, $10.95 each).
American Agricultural Economics Association, Department of Economics, Iowa State University, Ames, IA 50011.
American Alfalfa Processors Association, 10100 Santa Fe, Ste. 305, Overland Park, KS 66212.
American Angora Goat Breeders Association, 1 Sweden St., Rocksprings, TX 78880.
American Angus Association, 3201 Frederick Blvd., St. Joseph, MO 64501.
American Association of Nurseryman, 1250 T St. NW, Ste. 500, Washington, DC 20005.
American Beefalo World Registry, 116 Executive Park, Louisville, KY 40207.
American Beekeeping Federation, Box 1038, Jesup, GA 31545.
American Bison Association, c/o Laurie Dineen, Stockyard Station, PO Box 16660, Denver, CO 80216.
American Brahman Breeders Association, 1313 La Concha Ln., Houston, TX 77054.
American Dairy Science Association, 309 W Clark, Champaigne, IL 61820.
American Egg Board, 1460 Renaissance Drive, Park Ridge, IL 60068
"The Incredible Journey From Hen To Home (teaching kit).
American Farm Bureau Federation, Agriculture in the Classroom, 225 Touhy Ave., Park Ridge, IL 60068, (312)399-5764.
Agriculture in the Classroom Sourcebook (a reference guide to educational programs).
American Fish Farmers Federation, Rt. 2, Box 89, Lonoke, AR 72086.
American Forest Institute, 1619 Mass Ave. NW, Washington, DC 20036.
American Forestry Association, PO Box 2000, Washington, DC, 20013
"Hunting for Big Trees" (National Register of Big Trees).
American Greenhouse Vegetable Growers Association, 4071 E. Harney Lane, Lodi, CA 95240.
American Hampshire Sheep Association, Box 345, Ashland, MO 65010.
American Hereford Auxiliary, 616 Cherry Lane, Bartlesville, OK 74003.
American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.
American International Charolais Association, PO Box 20247, Kansas City, MO 64145.
American Jersey Cattle Club, Box 27310, Columbus, OH 43227.
American Milking Shorthorn, PO Box 449, Beloit, WI 53511.
American National Cattlewomen, PO Box 3881, Englewood, CA 80155 (brochure on beef by-products, 10 cents each).
American Nature Study Society, 5881 Cold Brook Rd., Homer, NY 13077.
American Paper Institute, Inc., 1250 Connecticut Ave., NW, Washington, DC 20036 (free poster and pamphlet on how to make paper in the classroom).
American Peanut Products, 412 1st St. SE, Ste. 964, Washington, DC 20003.
American Peanut Research and Education Society, 376 Ag Hall, Oklahoma State University, Stillwater, OK 74078.
American Poultry Association, Rt. 4, Box 351, Troy, NY 12180.
American Poultry Historical Society, Poultry Building, Purdue University, West Lafayette, IN 47907.
American Quilter's Society, PO Box 3290, Paducah, KY 42002-3290.
American Seed Trade Association, 1030 15th St. NW, Ste. 964, Washington, DC 20005.

American Sheep Industry Association, 6911 S. Yosemite St., Englewood, CA 80112-1414, (303)771-3500 (fact sheet, wool poster and general information, $5).

American Solar Energy Society, 2400 Central Ave., Ste. G-1, Boulder, CO 80301, (303)443-3130.
"Elementary and Secondary Science Projects in Renewable Energy and Energy Efficiency" ($10).

American Soybean Association, 1300 L St. NW, Ste. 950, Washington DC 20005-4107.

American Wool Council, Wool Education Center, 200 Clayton St., Denver, CO 80206.

Associated Milk Producers, Inc., 1700 N. Sooner Rd., Oklahoma City, OK 73111.

Associated Milk Producers, Inc., 6240 E. 15, Tulsa, OK 74112, (918)835-6933.
"Big Ideas, Secrets of Success" (free nutrition unit for grades 4-5).

Auxiliary of National Pork Producers Council, PO Box 10383, Des Moines, IA 50306, (515)223-2600.
"The New Pork: Delightfully Different" (educational kit).

Barbara Bannister, 1925 SE Taggart, Portland, OR 97202-2252. "Teaching Scientific Things ... Like Eggs" (a book of simple activities to teach the science of eggs, $17).

Beekeeping Education Service, PO Box 817, Cheshire, CT 06410.

Bottle Biology Resources Network, 1630 Linden Dr., Madison, WI, 53706, (608)263-5645 (free booklet showing hands-on biology experiments using plastic beverage bottles).
"Bottle Biology Book" ($15.95, plus $3 postage. For more information call, Kendall/Hunt Publishing Co., 1-800-228-0810).

Breck's Bulbs, Department 6523, N. Galena Rd., Peoria, IL 61632 (gardening tips and ideas).

Brown Swiss Cattle Breeders' Association, PO Box 1038, Beloit, WI 53511-1038.

Bureau of Land Management, Forest Service, PO Box 7469, Bend OR 97708-7469.
"Animal Inn" (information on the uses of trees).

BFA Educational Media, 478 Park Ave., New York, NY 10016.
"A First Film on Water Pollution" (for loan or purchase).

California Association of Nurserymen, 4620 Northgate Ave., Ste. 155, Sacramento, CA 95834, (916)567-0200.
"Planting Seeds, Growing Minds" (32-page curriculum teaches basic needs and concepts of seeds, plants, flowers and trees, $5 each).

California Department of Water Resources, PO Box 942836, Sacramento, CA 94236, (916)445-9371 (water education materials, free).

California Egg Commission, 1150 N. Mountain Ave., Ste. 14, Upland, CA 91786.

California Milk Advisory Board, Communications Services, PO Box 4680, Modesto, CA 90007 (free dairy lesson plans and posters for grades K-3).

California Strawberry Board, PO Box 269, Watsonville, CA 95077 (large color poster on strawberries, free).

California Women in Timber, PO Box 543, Pioneer, CA 95666.
"Caring for the Forest" (poster and activity masters, showing management, benefits and products derived from trees, free).

Center for Science in the Public Interest, Ste. 300, 1875 Connecticut Ave. N W, Washington, DC 20009.
"Healthy Eating Pyramid" (three-dimensional pyramid and teacher's guide, with nutrition tips following USDA food guidelines, free to teachers who order on school letterhead).

Chicago Board of Trade, Education Publications, LaSalle at Jackson, Chicago, IL 60604.

Clearinghouse, National Wildflower Research Center, 2600 FM 973 North, Austin, TX 78725-4201
"Growing Ideas Wildflower Packet" (packet containing lists of recommended wildflowers for specific areas, sources in your state, pressing wildflowers and much more, $8).

Common Ground Urban Garden Program, 2615 S. Grand Ave., Ste. 400, Los Angeles, CA 90007, (213)744-4341.
"A Child's Garden" (200-page field guide to developing school gardens, $7.75 plus tax. Make checks payable to Regents of University of California.)
"Children's Gardens: A Field Guide for Teachers, Parents and Volunteers" (gardening manual, $10, plus $2.50, shipping. Make checks payable to LA Harvest.)

Consumer Information Center, Department 159-Y, Pueblo, CO 81009
"Dietary Guidelines for Americans" (free)
"The Food Guide Pyramid Booklet (send $1 check or money order, payable to the Superintendent of Documents).

DAWN Publications, 14618 Tyler Foote Rd., Nevada City, CA 95959, 1-(800)545-7475
"A Day in the Forest: Nature Games for All Ages" (audiocassette by Joseph Cornell, $9.95, plus $3.50, shipping).

Decade Films, 555 Fifth Ave., New York, NY 10017, (212)984-2062.
"When a Tree Falls" (VHS, $14.95 per copy).

Delaware Department of Agriculture, 2320 S. DuPont Highway, Dover, DE 19901, (309)739-4811 (worksheets and teacher's guides for students to learn about farm life, using *Charlotte's Web* and *Little House on the Prairie.)*

Delaware Department of Agriculture, Forestry Section, 2320 S. DuPont Highway, Dover DE 19901, attn: Timothy Kaden.
"Trees and Shrubs for Living: For Wildlife," "Trees and Shrubs for Living: For Conservation in the Mid-Atlantic States" (field guides for grades 4-6, $5).

Department of Agriculture, Office of the Secretary, Washington, DC 20250.

Department of Water Resources, 1416 N. St., Room 338, PO Box 942836, Sacramento, CA 94236, (916)445-9371.
"Peter's Magical Water Journey" (flannel board story, with scripts and directions for making characters).
"Water Play" (booklet, with facts and activities about water).

Dupont Company, Graphics Center, 1515 S. Garnet Mine Rd., Boothwyn, PA 19061.
"Food for Thought" (free placemat, with facts and quiz about food consumption and technology).

EPCOT Educational Media, 500 S. Buena Vista St., Burbank, CA 91521, 1-(800)423-2555 (information and ideas on hydroponic gardening).

"Fast Plants/Bottle Biology," University of Wisconsin-Madison, Dept. of Plant Pathology, 1630 Linden Drive, Madison, WI 53706.
Notes (free newsletter with ideas for experiments, using Wisconsin Fast Plants and recyclable plastic beverage containers).
Wisconsin Fast Plants Elementary/Middle School Resource Manual (an idea book full of ways to use recyclable containers to teach about science and the environment, $15).

The Fertilizer Institute, 501 2nd St. NE, Washington, DC 20002.
"Agri-Balance: Not a Drop to Drink?" (VHS videotape about agriculture's impact on groundwater, free loan).

Fleischmann's Yeast, attn. Gloria McAdams, 14204 Triadelphia Mill Rd., Dayton, MD 21036, (410)531-5911 (bread baking kits. Each kit makes 30 loaves, $15 per kit.)

Florida Peanut Producers Association, PO Box 447, Graceville, FL 32440.
"Having Fun With Peanuts" (teachers guide and worksheets on history, nutrition and science, including pre-test and evaluation. Can be used as a unit of study.)

Flowerfield Enterprises, 10332 Shaver Rd., Kalamazoo, MI 49002, (616)327-0108.
Worms Eat Our Garbage: Classroom Activities for a Better Environment, (150 classroom activities designed for grades 4-8, with information on worms and worm composting systems, $19.95, plus $2 shipping).

Friends of the Urban Forest, 512 2nd St., 4th floor, San Francisco, CA 94107 (415)543-5000 (curriculum guide, with 75 activities for use in conjunction with a tree planting project, $50. Companion folder for specific activities, $25).

Fundamental Education, 12541 Winfree St., Chester, VA 23831, (804)796-3671.
"Our Earth: The Water Planet" (designed for students, age 8 to 12, the book shows an overview of the earth's hydrologic cycle and how all the other living things depend on the cycle).

Garden Club of America, 598 Madison Ave., New York, NY 10022
"The World Around You" (free environmental packet for grades 3-6, dealing with water quality and plants).

General Feed and Seed/Let's Get Growing, 1900-B Commercial Way, Santa Cruz, CA 94065.
"The Growing Classroom: Teacher's Guide to Activities" ($33.75, plus $4 shipping).

Gopher Crops and Soils Club, attn. Vernon Cardwell, Department of Agronomy, University of Minnesota, 1991 Buford Circle, St. Paul, MN 55108 (samples of crop seeds, weed seeds, crop plants and soil samples. Write for more information.)

A Green America Co., PO Box 1028, Pagosa Springs, CO 81147 (303)264-2286.

"Wee Sprout Package: Growing Sprouts in Water" (special package for educators, including growing jar, 16 page story book and sprout mixture, $2 per kit, 40 cents for refills, minimum order of one dozen).

Growers' Peanut Food Production, 109 S. Main St., Rocky Mountain, NC 27802 (free lesson plans, with poster and activity sheets covering history, nutrition, science and geography. Indicate grade level when ordering.)

GrowLab BioActivated Compost Project, Necessary Trading Company, One Nature's Way, New Castle, VA 24127-0305 (free unit of Compost BioActivator to speed up the the compost process).

Heifer Project International, 1015 S. Louisiana, PO Box 808, Little Rock, AR 72203.

"Read to Feed" (reproducible information on world hunger and the Heifer Project International, sample readers materials and award certificates, $1).

Holstein Association, 1 Holstein Place, Brattleboro, VT 05301.

Honey Bear Bread Box, PO Box 44, Dayton MD 21036 (bread-making kit for up to 28 participants includes everything but flour, oil and warm water, $29.95, plus $5 for shipping and handling).

Hungry Plants Carnivorous Plant Nursery, Education Division, 1216 Cooper Dr., Raleigh, NC 27607 (Send request for free catalog on school stationery to get educator's discount.)

Hydroponic Society of America, Box 6065, Concord, CA 94524, (415)682-4193.

IEPA-Illinois Environmental Protection Agency, IEPA Community Relations, Public Information Office of Chemical Safety, 2200 Churchhill Rd., PO Box 19276, Springfield, IL 62794-9276.

"Meet the Family Next Door" (poster illustrating the amount of trash produced annually by a family of four, free).

Illinois Agricultural Aviation Association, John Ogle, 331 S. Verzel, Macomb, IL 61455, (309)833-4493

"Agricultural Aviation" (booklet showing the role aviation plays in U.S. agriculture, free).

Illinois Farm Bureau, Ag in the Classroom, Field Services Division, 1701 Towanda Ave, Bloomington, IL 61701, (309)557-2219.

"America the Bountiful" (U.S. map showing major commodities and facts on agriculture, 20 cents).

"Animal Facts Wall Chart" (information about farm animals, how they grow and the products that are produced from the animal, 39 cents each, plus tax).

"The Fabulous Food Machine" (filmstrip and cassette showing how the farm supplies us with our daily needs, with ideas for projects about the farm, $25).

"Learning by Leaps: Agriculture and You" (12-minute videotape showing where common products come from, $25).

"My Family Farm" (bulletin board kit for grades 1-3, $4.75).

Illinois Pork Women Association, 6411 S. 6th St., Frontage Rd. East, Springfield, IL 62707, (217)529-3100.

"The Pig-Pork Story" (16-page booklet on pigs, how they are raised and their many uses, five cents each).

"Hog By-Product Math" (one-page worksheet for grades 3-6 with math and decoding problems, 3 cents each).

Illinois Soybean Program Operating Board, 2422 E. Washington St., Bloomington, IL 61704, (309)663-7692

"Soybeans: The Miracle Crop" (free two-page leaflet and placemat outlining the origin of the soybean in the U.S. and its many uses).

"Soy Oil" (free poster with examples of soy oil print).

International Cotton Advisory Committee, 1901 Penn Ave. NW, Ste. 201, Washington, DC 20006.

International Fainting Goat Association, Ruth Prentice, Registrar, Rt. Box 112, Terril IA 51364

International Paper, Inc., 6600 LBJ Freeway, Dallas, TX 75240, (214)934-4043.

"Twig's Paper Story" (coloring book and simple text that follows wood fiber from the forest through it's life cycle).

International Society of Arboriculture, 5 Lincoln Square, PO Box 71, Urbana, IL 61801.

"Arbor Day" (suggestions for Arbor Day activities, free).

Iowa Turkey Federation, 535 E. Lincoln Way, PO Box 825, Ames, IA 50010.

"Turkey Puzzle and Apple Turkey" (free worksheet and instructions for grades 2-5 on how to assemble a turkey from an apple).

Kansas Foundation for Ag in the Classroom, Bluemont 124, Kansas State University, Manhattan, KS 66506
"Wheat: From Field to Oven" (26-page student activity book, with background materials for teachers, $5).

Kansas Wheat Commission, 2630 Claflin Rd., Manhattan, KS 66502-2743.
"Everything You Wanted to Know About Wheat" (16-page booklet explains the process of wheat production and includes games, craft ideas, artwork, etc., free sample to teachers, 30 cents for multiple copies).

Kellogg Foundation, 400 N. Ave., Battle Creek, MI 49017-3398.

Lamb Education Center, 200 Clayton St., Denver, CO 80206.

LaSalle County Southwest Conservation District, Rt. 23 Dayton Rd., Ottawa, IL 61350.
"Annie Oakleaf Takes a Bough" (coloring book for grades K-4 showing how an acorn grows into a tree, 75 cents each).

Mabel C. Fry Public Library, 500 W. Main, Yukon, OK, 73099 (information about Grady, the Cow, Sue Kilmer, librarian).

McCormick and Company, Inc., Consumer Affairs, 211 Schilling Circle, Hunt Valley, MD 21031 (free samples and price list on educational materials).

Miami Soil and Water Conservation District, 1330 N. County Rd., 25A, Troy, Ohio 45373, (513)335-7666.
"Dirt Cookbook" (teaches about soil through hands-on contact, $6 plus $2 for shipping and handling).

Modern Talking Picture Service, 5000 Park St. North, St. Petersburg, FL 33709-9989, (813)541-5763.
"Modern Talking Picture Service Catalog" (catalog of free loan movies and videotapes, with over 40 listings of agricultural topics).

Mount Vernon Ladies Association, Mount Vernon, VA 22121 (seed packets of black-eyed Susan, love-lies-bleeding, New England aster and globe amaranth--flowers from the colonial era grown at Mount Vernon, gathered, cleaned and packaged by hand, $1 per packet).

NACD, PO Box 855, League City, TX 77574-9989.
"Sammy Soil Saver" (puppet with scripts for grades K-3, $49.95).

National Arbor Day Foundation, 100 Arbor Ave., Nebraska City, NE 68410.

National Broiler Association, Madison Building #614, 1155 15th St. NW, Washington, DC 20005.

National Buffalo Association, 10 E Main St., Ft. Pierre, SD 57532.

National Cattlemen's Association, 5420 S. Quebec St., Englewood, CO 80155.
"Twelve Myths and Facts" (videotape for grades 1-3 and 4-6, $15).

National Christmas Tree Association, 611 E. Wells St., Milwaukee, WI 53202 (VHS video and teacher's guide shows the planting, raising and harvesting of Christmas trees).

National Cotton Council, Communications Service, PO Box 12285, Memphis, TN 38182, (901)274-9030.
"The Story of Cotton" (classroom packet, with sample of cotton, film strip, informational booklet and a wall chart on cotton, $15 including postage).

National Cotton Council of America, 1110 Vermont Ave. NW, Ste. 430, Washington, DC 20005.

National Dairy Council, 6300 N. River Rd., Rosemont, IL 60018, 1-(800)426-8271.
"Milk from Cow to You" (teaching kit, $16).
"Food Keeps Me Healthy" (third grade nutrition unit, $35, order # 0893N).
"Food in America" (fourth grade nutrition unit $35, order # 0894N).

National Energy Foundation, National Office, 5160 Wiley Post Way, Ste. 200, Salt Lake City, UT 84116, (801)539-1406.
"Science Projects in Renewable Energy and Energy Efficiency" (free catalog).

National FFA Supply Service, 5632 Mt. Vernon Memorial Highway, Alexandria, VA 22309.
"Food for America" (teaching guide, with activities, $7.50 per kit).

National Farm-City Council, Inc., 225 Touhy Ave., Park Ridge, IL 60068.
"Slice" (lessons for primary and intermediate students introducing farm life to city kids, $3).

National Farmers Union, attn: Materials Order, Denver, CO 80251.
"Children Around the World" (information and activity booklet containing music, games and recipes from different countries with a focus on agriculture, $1.25 each).

National Gardening Association, 180 Flynn Ave., Burlington, VT 05401.

Growlab; A Complete Guide to Gardening in the Classroom, (128-page soft bound teacher's book, with reproducibles, $14.95, plus $3 shipping).

"Herbal Adventures," (basic herb-growing tips and activity ideas. Send request with a stamped, self-addressed envelope.)

National Geographic Educational Services, 17th and M St., NW, Washington, DC 20036.

"Farm Animals" (multimedia kit, 30 copies of eight-page booklet, read along tape and duplicating masters, $35).

National Geographic Society, Washington, DC 20090.

"Animals on the Farm" (15-minute videotape introducing characteristics of common farm animals, $68 per tape).

National Hereford Association, Rt. 5, Burwell, NE 68823.

National Honey Board, Attn: Mary Humann, 421 21st Ave., Ste. 203, Longmont, CO 80501-1421, (303)776-2337.

"What's Buzzin'" (free educational kit for grades 4-6, includes videotapes, worksheets, poster and teacher's guide).

National Livestock and Meat Board, 444 N Michigan Ave., Chicago, IL 60611.

National Milk Producers Federation, 1840 Wilson Blvd., 46th Floor, Arlington, VA 22201.

National Museum of Natural History, Publications Division, Smithsonian Institution, Washington, D.C. 20560.

"Good as Gold" (poster featuring 80 different foods of American origin available in food stores in the U.S. today, $6 each).

National Peanut Council, 101 S. Peyton St., Ste. 301, Alexandria, VA 22314 (703)838-9500.

National Pecan Marketing Council, 741 Piedmont Ave., Atlanta, GA 30308.

National Pork Councilwomen, PO Box 10383, Des Moines, IA 50306.

National Pork Producers Council, 501 School St. NW, Ste. 400, Washington, DC 20024.

National Soybean Processors Association, 1255 23rd St. NW, Ste. 850, Washington, DC 20037.

National Suffolk Sheep Association, 3316 Ponderosa, Box 324, Columbia, MD 65205.

National Sunflower Association, 1501 N. 12th, PO Box 2533, Bismark, ND 58502.

National Tree Bank Program, 1455 Pennsylvania Ave. NW, Ste. 250, Washington, DC 20004, (200)628-TREE (information on planting and caring for trees).

National Turkey Federation, 11319 Sunset Hills Rd, Reston, VA 22090.

National Wildlife Federation, Leesburg Pike, Vienna, VA 22180.

National Wool Growers Association, 425 13th St. NW, Ste. 826, Washington, DC 20004.

Natural Organic Farmers Association, 150 Clinton, Concord, NH 03301.

Nebraska Association of Resources Districts, 1327 H St., Ste. 102, Lincoln, NE 68508, (402)474-3383.

"Puddle Pictures" (card game similar to Pictionary teaches conservation and environmental awareness to grades K-12, $5 per deck of cards).

Nebraska Corn Board, 301 Centennial Mall S., PO Box 95107, Lincoln, NE 68509.

"Color it Corn" (23-page coloring book for grades 1-4, one free copy, with permission to photocopy).

Nebraska Hereford Auxiliary, c/o Mendad Phifer, Rt. 1, Mason City, NE 63355.

"Our Friend Herfy" (32-page storybook for preschool and K-3, $4, plus 90 cents for postage and handling).

Nebraska Pork Council Women, Inc., A103 Animal Science, University of Nebraska, Lincoln, NE 68583-0834.

"Short Snoots" (children's newsletter).

New England Sprout Growers Association, PO Box 270, Marion, MA 02738, (508)763-2577 (free activity sheets on sprouts for grades K-6).

New York Ag in the Classroom, Cornell University, 111 Kennedy Hall, Ithaca, NY 14853.

"How a Tree Grows" (poster,$2.50).

"Pizza Poster" ($2.50).

"New York State Arbor Day" (eight-panel brochure for teacher reference, with suggestions for community involvement and environmental activities, 25 cents).

Noble C. Fry Public Library, 500 W. Main, Yukon, OK 73099, Sue Kilmer, librarian (information on Grady, the Cow).

North Dakota Agriculture In the Classroom, Department of Agriculture, 601 Capital Building, Bismark, ND 58505.

"Creative Ways to Cultivate Agriculture" (256-page teacher's guide containing lesson plans, task cards and poetry related to farming, $9.95).

North Dakota State Water Commission, Dennis Nelson, WET Program Coordinator, 900 E. Blvd., Bismark, ND 58505.

"Water is Our Best Friend" (hands-on activities guide introducing water to children).

North Dakota Wheat Commission, 4023 N. State St., Bismark, ND 58501-0263.

"Walter and Wanda Grow Up" (30 free booklets).

Oklahoma Atlas Project, c/o Dr. Thomas A. Wikle, Department of Geography, Oklahoma State University, Stillwater, OK, 74078.

Oklahoma Atlas (180 pages, $10, plus $2 for postage and handling).

Oklahoma Beef Industry Council, 5101 N. Classen, Ste. 210, Oklahoma City, OK 73118.

Oklahoma Cattlemen's Association, 2500 Exchange, Oklahoma City, OK 73108, (405)235-4391.

Oklahoma Cattlewomen's Association, attn. Marilyn Whetsell, Rt.1, Box 174, Pawhuska, OK 74056.

Oklahoma Conservation Commission, Attn: Brenda Wiser, Education Coordinator, 2800 N. Lincoln Blvd., Oklahoma City, OK 73105.

"Project Learning Tree" (activity guide using forests and natural concepts. Training required.)

Oklahoma Cooperative Extension Service, 4-H programs, 205 Poultry Science Building, Oklahoma State University, Stillwater, OK 74078, or contact your county Extension office.

"Caring for Planet Earth" (six free lessons on the environment for grades 4-6, with supplementary computer games available on loan from county Extension offices).

"Oklahoma Aqua Times" (free unit on water quality).

Oklahoma Cooperative Extension Service (see listings under county government for the office serving your county for information about educational programs in agriculture, youth development, human environmental sciences and rural development).

Oklahoma Department of Wildlife Conservation, attn: Luann Waters, Conservation Education, 1801 N. Lincoln, Oklahoma City, OK 73105.

"Project Wild" (activity guide using wildlife and natural resources concepts. Training required.)

"Aquatic Project Wild" (activity guide for teaching about water. Training required.)

Oklahoma Egg Council, Attn: Dr. Joe Berry, 201 Animal Science Dept., OSU, Stillwater, OK 74078-0425.

Oklahoma Farm Bureau, 2501 N. Stiles, Oklahoma City, OK 73105-3196.

Oklahoma Farmers Union, 6200 NW 2nd, P.O. Box 24000, Oklahoma City, OK 73124.

Oklahoma Peanut Commission, 624 W. Independence #111, Box 1949, Shawnee, OK 74802, (405)275-5994, Fax (405)878-0887.

Oklahoma Pork Council, attn. Dutch Miller, Rt.1 Box 254, Depew, OK 74028.

Oklahoma Sheep and Wool Producers Inc., attn. Don Chandler, Rt. 2, Box 175, Watonga, OK 73772.

Oklahoma State Department of Agriculture, 2800 N. Lincoln Blvd., Oklahoma City, OK 73105.

"My 4 1/2 Acres" (free poster, with games and stickers, showing that all the agricultural products the average American uses in a year requires 4 1/2 acres of farm land).

Oklahoma State Department of Agriculture, Forestry Division, 2800 N. Lincoln Blvd., Oklahoma City, OK 73105.

"Forest Trees of Oklahoma, How to Know Them" (publication No. 13).

Oklahoma State University, Division of Agricultural Sciences and Natural Resources, 136 Ag Hall, OSU, Stillwater, OK 74078. (attn: department desired.)

Oklahoma Water Resources Board, PO Box 150, Oklahoma City, OK 73101-0150.

Oklahoma Wheat Commission, 800 NE 63rd, Oklahoma City, OK 73105.

Oklahoma Women for Agriculture, c/o Jean Wyatt, Rt. 2 Box 49, Geronimo, OK 73543.

Oregon Wheat Commision, 1200 NW Front Ave. #520, Portland, OR 97209-28800.

"Wheat, Flour and Food" (15-page booklet tells how flour is made and provides history of wheat and nutritional information, one free copy).

Oregon Women for Agriculture, 11871 SE Eola Hills Rd., Amity, OR 97101.

"Farming's Fantastic Facts" (booklet for grades 4-6).

Outdoor Products and Programs, PO Box 1492, Oxford, MS 38655, (601)234-8387.
"Nature Study Replicas" (kits containing replicas of distinctive trees of each state. Write for more information and a catalog).
Peanut Butter and Nut Processors Association, 9005 Congressional St., Potomac, MD 20854.
Pendleton Woolen Mills, Wool Chart, PO Box 3030, Portland, OR, 97208-3030 (free wool chart and booklets, video for loan).
The Popcorn Institute, 111 E. Wacker Dr., Ste. 600, Chicago, IL 60601 (free popcorn teaching guide for grades 1-3 and 4-6, including nutritional information and the history of popcorn. Send 45 cents and an eight-by 12-inch self-addressed stamped envelope).
Progressive Farmer, Box 69, Birmingham, AL 35283-0069.
"Farmers, the Original Environmentalists" (poster, $9.95).
Project Learning Tree, 1819 Mass Ave. NW, Washington, DC 20036.
Project Wild, Salma Star Route, Boulder, CO 80302.
Riverside-Corona Resource Conservation District, 2023 Chicago Ave., B-14, Riverside, CA 92507-2305 (eight-page activity packet with hands-on projects about soil, minimal charge).
SSU Academic Foundations, Energy Center, Sonoma State University, Rohnert Park, CA 94928, (707)664-2577.
"Conserve and Renew" (energy education activity package for Grades 4-6, $12).
Sacramento Municipal Utility District, PO Box 15830, Sacramento, CA 95852-1830, (916)452-3211.
"Solar Box Cooker" (plans for building a regular solar cooker, $1, or ready-made foldable units, $55, including shipping, lesson package, $5).
San Francisco Herb Company, 1-(800)227-4530 (free catalog of herbs and potpourri supplies for classroom creations).
Santa Barbara Botanic Garden, 1212 Mission Canyon Rd., Santa Barbara, CA 93105, (805)682-4726, Fax (805)563-0352.
"Tree Talk" (16 activities for grades K-6 showing the parts of a tree and their functions, $19.95, plus $10 for shipping).
"Nature Kit: From Seeds to Sprouts!" (22 activities for grades K-6 showing the parts of flowering plants and their functions and seed structure, germination and dispersal, $19.95, plus $10 for shipping).
"Nature Kit: Cones of California" (13 activities designed for grades K-8 covering the diversity of cone-bearing plants, their parts and functions and the ecology of conifers, $19.95 per book, plus $10 for shipping).
(The set of all three books is available for $55, plus $10 for up to 10 books. Add $2.00 for each 5 additional books.)
Sperry New Holland, PO Box 6219, Stockton, CA 95206, attn: Phawanda Cochran.
"The Reliable Farmer" (pamphlet).
Society of American Foresters, 5400 Grosvenor Lane, Bethesda, MD 20814.
Soil Conservation Service, USDA, PO Box 2890, Washington, DC 20013.
Soil Conservation Service, 1345 Main St., Red Bluff, CA 96080. "Teaching Soil and Water Conservation: A Classroom and Field Guide" (22 hands-on lessons that teach the concepts of soil erosion and the importance of conservation, free).
"Soil Erosion by Wind" (free publication detailing the scope of wind erosion and how farmers plan to protect their soil).
"Soil Erosion by Wind" (free booklet explaining soil erosion by water and what actions must be taken to save it).
Soil and Water Conservation Society of America, 7515 NE Ankeny Rd., Ankeny, IA 50021-9764, 1-(800)THE-SOIL.
"The Story of Land : Its Uses and Misuses Through the Centuries" (25 cents each; teacher's guide, 15 cents).
Stage Fright Productions, PO Box 373, Geneva, IL 60134.
"Farm Animals, Close Up and Very Personal" (VHS tape, $16.95).
TAFP/Caring for the Forest, 629 S. Rancho Santa Fe Rd., #334, San Marcos, CA 92069, (619)744-4220.
"Caring for the Forest" (poster and five ready-to-use activities to teach trees, wood products, careers and forestry management, $8.50).

"Trees are for People" (mini-unit to teach awareness and appreciation of trees, $5).

Teen Sitter's Guide, USDA-FSIS, Consumer Education, Room 1165, S. 14th and Independence Ave., SW, Washington, DC 20250.

"Feeding Babies and Young Children" (one-page flyer includes information on preparing baby bottles, making sure baby food is safe and preparing snacks for older children).

The Terrene Institute,1000 Connecticut Ave., NW, Ste. 802, Washington, DC 20036, (202)833-8317.

"Your Guide to Preventing Water Pollution"

Trees are for People, 629 S. Rancho Santa Fe Rd., San Marcos, CA 92069, (619)744-4220 (mini-unit to teach awareness and appreciation of trees, $5).

Trees for Life, 1103 Jefferson, Wichita, KS, 67203 (class tree- planting kit).

Triangle Coalition for Science and Technology Education, c/o NSTA Special Projects, 5112 Berwyn Rd., 3rd floor, College Park, MD 20740 (send for information on the National Balloon Launch for Weather Studies).

United Egg Association, 1000 Thomas Jefferson St., NW, Ste. 610, Washington, DC 20007.

United Egg Producers, 2501 M St., NW, Ste. 410, Washington, DC 20037.

United Fresh Fruit/Vegetable Association, 727 N Washington St., Alexandria, VA 22314.

U.S. Department of Agriculture, Administrative Building, Room 318A, Washington, DC 20250.

"Glossary of Farm Terms (definitions and some illustrations, free).

U. S. Department of Agriculture, Forest Service, PO Box 2417, Washington, DC 20013.

"How a Tree Grows" (detailed explanation of the parts of a tree, with illustrations).

USDA/HNIS, 6505 Belcrest Rd., Room 328-A, Hyattsville, MD 20782, (301)436-8617 (free four-color 21- by 28-inch poster featuring the food guide pyramid, while supplies lasts).

U. S. Department of Agriculture, Soil Conservation Service, PO Box 2890, Washington, DC 20013, 1-(800)THE-SOIL.

"Harmony: The Seasons, The Sun, The Water" (free action packet, including conservation tip cards, poster, bumper sticker and coloring book illustrating native American attitudes toward soil conservation).

U. S. Department of Agriculture, Soil Conservation Service, attn: Kay Kitchen-Maran, Public Affairs Specialist, 1902 Fox Drive, Champaign, IL 61820.

"Water in Your Hands" (15-page comic book explaining the uses of water, free for educational proposes).

U.S. Environmental Protection Agency, 230 S. Deerborn St., Chicago, IL 60604, (312)886-0209.

"Pollution... Every Little Bit Hurts" (brochure illustrating different types of pollution, including most-asked questions about water pollution).

U.S. Hide Skin and Leather Association, 1701 N. St., NW, Washington, DC 20036.

U. S. Geologic Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225.

"Map #I-2206, Landform of the Coterminous United States: A Digital Shaded Relief Portrayal" (computer image based on contour lines detailing rock types, faults/folds and mountain types, with explanation booklet, $5, plus $1 shipping for orders under $10).

VIDEO PALS, 1-800-VID-PALS (an organization which sets up national and international video exchange contacts. The organization will try to match you or your classes specific interests.)

Vocational Education Products, Cal Poly, SLO, San Luis Obispo, CA 93407, 1-(800)235-4146.

"America the Bountiful" (six-part video series on the history of American agriculture using reenactments, interviews and art, $89.95 per segment, free informational brochure).

Yarnhill County Women for Agriculture, PO Box 101, Dayton, OR 97114.

"The Great Green Bean" (videotape, $12).

"It's Turkey Time" (videotape, $12).

Young Naturalist Company, 614 E. 5th St., Newton, KS 67114, (316)-283-4103.

"Nature Education Kits" (real specimens, teacher's guide and activities, $19.95 to $24.95).

Washington Apples, PO Box 550, Wenatchee, WA 98807.

"Healthy Choices for Kids" (one free copy of nutrition education materials for grades 1-5, based on 1990 dietary guidelines).

Watch It Grow, 2560 Nickel Place, Hayward, CA 94545.

"A Child's Garden Seed Collection," $1.

Wheat Flour Institute, 600 Maryland Ave., SW, Ste. 305W, Washington, DC 20024.

Wheat Industry Council, 6000 Executive Blvd., Ste. 203, Rockville, MD 20852.

Wildflower Seed Collection, attn: Kathy Wildman, 3977 Condit Rd., Sunbury, OH 43074, (614)965-2133 (collections of wildflowers. Each collection consists of at least 20 packets, including wildflower seed mixtures and single species, $5, plus $2.50 for each additional collection ordered).

Wildlife Management Institute, 1101 14th St., NW, Ste. 725, Washington, DC 20005.

Wildseed Farms, Inc., Dept. NGL, PO Box 308, Eagle Lake, TX 77434 (one free packet of blackeyed Susans and an educational wildlife catalog. Send the request along with a self addressed, stamped envelope).

Lessons by Agricultural Topic

Beef

AG LIBS ..... LA 2
BARNYARD MATH ..... M 1
BUILD A BURGER ..... R 3
THE BRAND OF HISTORY ..... R 4
CHEW IT TWICE ..... S 7
FARM CODES ..... LA 3
GOODNESS, GRADY! ..... R 2
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
WHAT'S YOUR BRAND? ..... SS 7

Bees

BEE DANCE ..... VA 5
BEESWAX ..... M 9
HONEY HUNT ..... SS 2

Careers

A DAY WITHOUT AG ..... LA 1
BACK TO THE FARM ..... SS 3
BREAKING THEM DOWN ..... LA 12
FARM CONNECTIONS ..... LA 4
LET YOUR FINGERS DO THE WALKING ..... IS 1

Cattle

BARNYARD MATH ..... M 1
THE BRAND OF HISTORY ..... R 4
CHEW IT TWICE ..... S 7
FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
GOODNESS, GRADY! ..... R 2
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
A LICENSE FOR AG ..... VA 3
PICKING PEANUTS ..... LA 7
PILE ON THE CHIPS ..... S 2
WHAT'S YOUR BRAND? ..... SS 7
THE WHEAT PLANT ..... S 4

Composting

CASE OF THE MISSING PUMPKIN ..... S 1
RIDE THE WILD LEAF CYCLE ..... R 6
WORM WATCHING ..... S 9

Cotton

BE A BUG SCOUT ..... M 8
COVERED IN QUILTS ..... VA 1
A DAY WITHOUT AG ..... LA 1
FARM CODES ..... LA 3
FROM BOLLS TO BOLTS ..... R 5
A LICENSE FOR AG ..... VA 3
OKLAHOMA GROWN ..... SS 4
SEED SWAPPING ..... M 7

Crops

AG LIBS ..... LA 2
BARNYARD MATH ..... M 1
BE A BUG SCOUT ..... M 8
FROM BOLLS TO BOLTS ..... R 5
THE GRAIN GAME ..... M 6
HONEY HUNT ..... SS 2
NATURE'S COLORS ..... VA 6
OKLAHOMA GROWN ..... SS 4
PICKING PEANUTS ..... LA 7
SEED SWAPPING ..... M 7
SNACK SACK ..... M 4
THE WHEAT PLANT ..... S 4
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11
WHERE DOES THE RAIN FALL? ..... SS 8

Dairy

BARNYARD MATH ..... M 1
BUILD A BURGER ..... R 3
FARM CODES ..... LA 3
LET YOUR FINGERS DO THE WALKING ..... IS 1
THE TRADING GAME ..... SS 6
TIN CAN TREAT ..... S 5

Economics

AG LIBS ..... LA 2
BACK TO THE FARM ..... SS 3
BREAKING THEM DOWN ..... LA 12
CHECK YOUR FARM ACCOUNT ..... M 2
A DAY WITHOUT AG ..... LA 1
THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT ..... IS 5
FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
LET YOUR FINGERS DO THE WALKING ..... IS 1
A LICENSE FOR AG ..... VA 3
THE TRADING GAME ..... SS 6
WHEAT: FROM FIELD TO MILL ..... LA 10

Environment and Ecology

BE A BUG SCOUT ..... M 8
CASE OF THE MISSING PUMPKIN ..... S 1
LET IT RAIN ..... S 8
LOOK OUT, BELOW! ..... IS 3
NATURE'S COLORS ..... VA 6
THE PAPER CHASE ..... M 3
PILE ON THE CHIPS ..... S 2
RIDE THE WILD LEAF CYCLE ..... R 6
SAVE OUR SOIL ..... S 10
SOAK IT UP ..... S 11
WHERE DOES THE RAIN FALL? ..... SS 8
WORM WATCHING ..... S 9

Farm Animals

AG LIBS ..... LA 2
BARNYARD MATH ..... M 1
THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT ..... IS 5
FLEECE AS WHITE AS SNOW? ..... R 1
GOODNESS, GRADY! ..... R 2
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
RACING ROOSTERS ..... LA 8
THOSE PUZZLING PORKERS ..... LA 9
WHAT'S YOUR BRAND? ..... SS 7

Farm Equipment

BARNYARD MATH ..... M 1
A DAY WITHOUT AG ..... LA 1
FARM CODES ..... LA 3
FROM BOLLS TO BOLTS ..... R 5
GOODNESS, GRADY! ..... R 2
LET YOUR FINGERS DO THE WALKING ..... IS 1
TIME LINE OF THE LAND ..... SS 5
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11
WRITING THE WIND ..... LA 6

Foods and Nutrition

A DAY WITHOUT AG ..... LA 1
BUILD A BURGER ..... R 3
GARDEN GRID ..... M 10
HONEY HUNT ..... SS 2
THE GRAIN GAME ..... M 6
LABEL LANGUAGE ..... IS 6
PICKING PEANUTS ..... LA 7
SEED SWAPPING ..... M 7
STACK UP TO NUTRITION ..... VA 4
SNACK SACK ..... M 4
THOSE PUZZLING PORKERS ..... LA 9
TIN CAN TREAT ..... S 5
WHAT'S IN THE GARDEN? ..... IS 4
WHEAT: FROM MILL TO OVEN ..... LA 11

Forestry

A DAY WITHOUT AG ..... LA 1
AG LIBS ..... LA 2
BRANCHING INTO SPRING ..... S 6
FARM CODES ..... LA 3
NATURE'S COLORS ..... VA 6
OKLAHOMA GROWN ..... SS 4
THE PAPER CHASE ..... M 3
RINGS OF LIFE ..... S 3
RIDE THE WILD LEAF CYCLE ..... R 6
SEED SWAPPING ..... M 7
WHERE DOES THE RAIN FALL? ..... SS 8

Gardening and Horticulture

AG LIBS ..... LA 2
BRANCHING INTO SPRING ..... S 6
CASE OF THE MISSING PUMPKIN ..... S 1
EASY AS PUMPKIN PIE ..... M 5
FARM CODES ..... LA 3
GARDEN GRID ..... M 10
HONEY HUNT ..... SS 2
NATURE'S COLORS ..... VA 6
WHAT'S IN THE GARDEN? ..... IS 4
SEED SWAPPING ..... M 7

Grains

FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
THE GRAIN GAME ..... M 6
GOODNESS, GRADY! ..... R 2
A LICENSE FOR AG ..... VA 3
OKLAHOMA GROWN ..... SS 4
SNACK SACK ..... M 4

Horse

BARNYARD MATH ..... M 1
GOODNESS, GRADY! ..... R 2
A LICENSE FOR AG ..... VA 3

Insects

BE A BUG SCOUT ..... M 8
BEE DANCE ..... VA 5
BEESWAX ..... M 9
BUILD A BUG BARN ..... IS 2
FARM CODES ..... LA 3
HONEY HUNT ..... SS 2

Oklahoma History

BACK TO THE FARM ..... SS 3
THE BRAND OF HISTORY ..... R 4
COVERED IN QUILTS ..... VA 1
A DAY WITHOUT AG ..... LA 1
DIRTY PICTURES ..... VA 2
GOODNESS, GRADY! ..... R 2
A LICENSE FOR AG ..... VA 3
PILE ON THE CHIPS ..... S 2
RINGS OF LIFE ..... S 3
WHAT'S YOUR BRAND? ..... SS 7
WRITING THE WIND ..... LA 6

Pecans

AG LIBS ..... LA 2
FARM CODES ..... LA 3
A LICENSE FOR AG ..... VA 3
OKLAHOMA GROWN ..... SS 4
SEED SWAPPING ..... M 7

Poultry
AG LIBS ..... LA 2
BARNYARD MATH ..... M 1
FARM CODES ..... LA 3
LET YOUR FINGERS DO THE WALKING ..... IS 1
A LICENSE FOR AG ..... VA 3
MAKE MINE TURKEY ..... M 11
PICKING PEANUTS ..... LA 7
RACING ROOSTERS ..... LA 8
THE TRADING GAME ..... SS 6

Pumpkins
CASE OF THE MISSING PUMPKIN ..... S 1
EASY AS PUMPKIN PIE ..... M 5
FARM CODES ..... LA 3
GARDEN GRID ..... M 10
SEED SWAPPING ..... M 7

Rural Life
AG LIBS ..... LA 2
BE A BUG SCOUT ..... M 8
CHECK YOUR FARM ACCOUNT ..... M 2
THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT ..... IS 5
FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
FIND YOUR WAY ON THE FARM ..... SS 1
TIME LINE OF THE LAND ..... SS 5
WHEAT: FROM FIELD TO MILL ..... LA 10

Sheep
FARM CODES ..... LA 3
FLEECE AS WHITE AS SNOW ..... R 1
GOODNESS, GRADY! ..... R 2
WHAT'S YOUR BRAND ..... SS 7

Soil
BUILD A BUG BARN ..... IS 2
CASE OF THE MISSING PUMPKIN ..... S 1
DIRTY PICTURES ..... VA 2
GARDEN GRID ..... M 10
LET IT RAIN ..... S 8
LOOK OUT BELOW! ..... IS 3
OKLAHOMA GROWN ..... SS 4
PILE ON THE CHIPS ..... S 2
RIDE THE WILD LEAF CYCLE ..... R 6
SAVE OUR SOIL ..... S 10
SOAK IT UP ..... S 11
WHERE DOES THE RAIN FALL? ..... SS 8
WORM WATCHING ..... S 9

Soybeans
BUILD A BURGER ..... R 3
A DAY WITHOUT AG ..... LA 1
GOODNESS, GRADY! ..... R 2
OKLAHOMA GROWN ..... SS 4
SEED SWAPPING ..... M 7
THE TRADING GAME ..... SS 6
THOSE PUZZLING PORKERS ..... LA 9

Swine
FARM CODES ..... LA 3
A LICENSE FOR AG ..... VA 3
OKLAHOMA GROWN ..... SS 4
PICKING PEANUTS ..... LA 7

Weather
FARM CODES ..... LA 3
LET IT RAIN ..... S 8
OKLAHOMA GROWN ..... SS 4
WHEAT: FROM FIELD TO MILL ..... LA 10
THE WHEAT PLANT ..... S 4
WHERE DOES THE RAIN FALL? ..... SS 8
WRITING THE WIND ..... LA 6

Wheat
A DAY WITHOUT AG ..... LA 1
AG LIBS ..... LA 2
BUILD A BURGER ..... R 3
FARM CODES ..... LA 3
THE GRAIN GAME ..... M 6
LET YOUR FINGERS DO THE WALKING ..... IS 1
OKLAHOMA GROWN ..... SS 4
SNACK SACK ..... M 4
THE TRADING GAME ..... SS 6
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11
THE WHEAT PLANT ..... S 4

Lessons by Ag in the Classroom Concept

Concept I

A DAY WITHOUT AG ..... LA 1
AG LIBS ..... LA 2
BARNYARD MATH ..... M 1
BEE DANCE ..... VA 5
BEESWAX ..... M 9
BRANCHING INTO SPRING ..... S 6
CHECK YOUR FARM ACCOUNT ..... M 2
EASY AS PUMPKIN PIE ..... M 5
FARM CODES ..... LA 3
FLEECE AS WHITE AS SNOW? ..... R 1
THE GRAIN GAME ..... M 6
HONEY HUNT ..... SS 2
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
A LICENCE FOR AG ..... VA 3
OKLAHOMA GROWN ..... SS 4
RACING ROOSTERS ..... LA 8
SEED SWAPPING ..... M 7
SNACK SACK ..... M 4
STACK UP TO NUTRITION ..... VA 4
THOSE PUZZLING PORKERS ..... LA 9
WHAT'S IN THE GARDEN? ..... IS 4
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11

Concept II

BACK TO THE FARM ..... SS 3
BUILD A BURGER ..... R 3
MAKE MINE TURKEY ..... M 11
THE TRADING GAME ..... SS 6

Concept III

BE A BUG SCOUT ..... M 8
THE BRAND OF HISTORY ..... R 4
COVERED IN QUILTS ..... VA 1
DIRTY PICTURES ..... VA 2
THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT ..... IS 5
FARM CONNECTIONS ..... LA 4
FIND YOUR WAY ON THE FARM ..... SS 1
GOODNESS, GRADY! ..... R 2
NATURE'S COLORS ..... VA 6
PICKING PEANUTS ..... LA 7
TIME LINE OF THE LAND ..... SS 5
WHAT'S YOUR BRAND? ..... SS 7

Concept IV

BUILD A BUG BARN ..... IS 2
CASE OF THE MISSING PUMPKIN ..... S 1
CHEW IT TWICE ..... S 7
FROM BOLLS TO BOLTS ..... R 5
GARDEN GRID ..... M 10
LET IT RAIN ..... S 8
LOOK OUT BELOW! ..... S 3
PILE ON THE CHIPS ..... S 2
RIDE THE WILD LEAF CYCLE ..... R 6
RINGS OF LIFE ..... S 3
SAVE OUR SOIL ..... S 10
SOAK IT UP ..... S 11
WHERE DOES THE RAIN FALL? ..... SS 8
WORM WATCHING ..... S 9

Concept V

LABEL LANGUAGE ..... IS 6
THE PAPER CHASE ..... M 3
THE WHEAT PLANT ..... S 4
TIN CAN TREAT ..... S 5
WRITING THE WIND ..... LA 6

Concept VI

BREAKING THEM DOWN ..... LA 12
LET YOUR FINGERS DO THE WALKING ..... IS 1

Lessons by Grade Level

Grades 3-4

A DAY WITHOUT AG ..... LA 1
A LICENSE FOR AG ..... VA 3
AG LIBS ..... LA 2
BARNYARD MATH ..... M 1
CASE OF THE MISSING PUMPKIN ..... S 1
CHECK YOUR FARM ACCOUNT ..... M 2
COVERED IN QUILTS ..... VA 1
DIRTY PICTURES ..... VA 2
FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
FLEECE AS WHITE AS SNOW? ..... R 1
LET YOUR FINGERS DO THE WALKING ..... IS 1
PILE ON THE CHIPS ..... S 2
RINGS OF LIFE ..... S 3
SNACK SACK ..... M 4
STACK UP TO NUTRITION ..... VA 4
THE PAPER CHASE ..... M 3
THE WHEAT PLANT ..... S 4
TIN CAN TREAT ..... S 5
WRITING THE WIND ..... LA 6
BACK TO THE FARM ..... SS 3

Grade 3

BEE DANCE ..... VA 5
BRANCHING INTO SPRING ..... S 6
BUILD A BUG BARN ..... IS 2
BUILD A BURGER ..... R 3
CHEW IT TWICE ..... S 7
EASY AS PUMPKIN PIE ..... M 5
FIND YOUR WAY ON THE FARM ..... SS 1
GOODNESS, GRADY! ..... R 2
HONEY HUNT ..... SS 2
LET IT RAIN ..... S 8
LOOK OUT BELOW! ..... IS 3
PICKING PEANUTS ..... LA 7
RACING ROOSTERS ..... LA 8
SEED SWAPPING ..... M 7
THE GRAIN GAME ..... M 6
THOSE PUZZLING PORKERS ..... LA 9
WHAT'S IN THE GARDEN? ..... IS 4
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11
WORM WATCHING ..... S 9

Grade 4

BE A BUG SCOUT ..... M 8
BEESWAX ..... M 9
BREAKING THEM DOWN ..... LA 12
FROM BOLLS TO BOLTS ..... R 5
GARDEN GRID ..... M 10
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
LABEL LANGUAGE ..... IS 6
MAKE MINE TURKEY ..... M 11
NATURE'S COLORS ..... VA 6
OKLAHOMA GROWN ..... SS 4
RIDE THE WILD LEAF CYCLE ..... R 6
SAVE OUR SOIL ..... S 10
SOAK IT UP ..... S 11
THE BRAND OF HISTORY ..... R 4
THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT ..... IS 5
THE TRADING GAME ..... SS 6
TIME LINE OF THE LAND ..... SS 5
WHAT'S YOUR BRAND? ..... SS 7
WHERE DOES THE RAIN FALL? ..... SS 8

Lessons by Title

A DAY WITHOUT AG ..... LA 1
A LICENSE FOR AG ..... VA 3
AG LIBS ..... LA 2
BACK TO THE FARM ..... SS 3
BARNYARD MATH ..... M 1
BE A BUG SCOUT ..... M 8
BEE DANCE ..... VA 5
BEESWAX ..... M 9
BRANCHING INTO SPRING ..... S 6
THE BRAND OF HISTORY ..... R 4
BREAKING THEM DOWN ..... LA 12
BUILD A BUG BARN ..... IS 2
BUILD A BURGER ..... R 3
CASE OF THE MISSING PUMPKIN ..... S 1
CHECK YOUR FARM ACCOUNT ..... M 2
CHEW IT TWICE ..... S 7
COVERED IN QUILTS ..... VA 1
DIRTY PICTURES ..... VA 2
EASY AS PUMPKIN PIE ..... M 5
THE FABLE OF FRANNY AND HER FABULOUS FAINTING GOAT ..... IS 5
FARM CODES ..... LA 3
FARM CONNECTIONS ..... LA 4
FIND YOUR WAY ON THE FARM ..... SS 1
FLEECE AS WHITE AS SNOW? ..... R 1
FROM BOLLS TO BOLTS ..... R 5
GARDEN GRID ..... M 10
GOODNESS, GRADY! ..... R 2
THE GRAIN GAME ..... M 6
HONEY HUNT ..... SS 2
HOW THE BRAHMAN BULL GOT HIS HUMP ..... LA 5
LABEL LANGUAGE ..... IS 6
LET IT RAIN ..... S 8
LET YOUR FINGERS DO THE WALKING ..... IS 1
LOOK OUT, BELOW! ..... IS 3
MAKE MINE TURKEY ..... M 11
NATURE'S COLORS ..... VA 6
OKLAHOMA GROWN ..... SS 4
THE PAPER CHASE ..... M 3
PICKING PEANUTS ..... LA 7
PILE ON THE CHIPS ..... S 2
RACING ROOSTERS ..... LA 8
RIDE THE WILD LEAF CYCLE ..... R 6
RINGS OF LIFE ..... S 3
SAVE OUR SOIL ..... S 10
SEED SWAPPING ..... M 7
SNACK SACK ..... M 4
SOAK IT UP ..... S 11
STACK UP TO NUTRITION ..... VA 4
THE TRADING GAME ..... SS 6
THOSE PUZZLING PORKERS ..... LA 9
TIME LINE OF THE LAND ..... SS 5
TIN CAN TREAT ..... S 5
WHAT'S IN THE GARDEN? ..... IS 4
WHAT'S YOUR BRAND? ..... SS 7
WHEAT: FROM FIELD TO MILL ..... LA 10
WHEAT: FROM MILL TO OVEN ..... LA 11
THE WHEAT PLANT ..... S 4
WHERE DOES THE RAIN FALL? ..... SS 8
WORM WATCHING ..... S 9
WRITING THE WIND ..... LA 6

Concepts for Oklahoma Ag in the Classroom

I A basic awareness of agriculture, what it entails and how it relates to everyone's need for food and fiber.

II The place of agriculture in the society and the interdependence of society and agriculture, economically.

III The social system that surrounds an agricultural community, including history and cultural significance.

IV The importance of soil, water, air and solar energy to the agriculture industry and the interrelationship of agriculture with the environment.

V The place of science in the production of food and fiber.

VI The many occupations that are related to the production, processing and distribution of food and fiber.

Oklahoma Counties

262

263

Pattern 1

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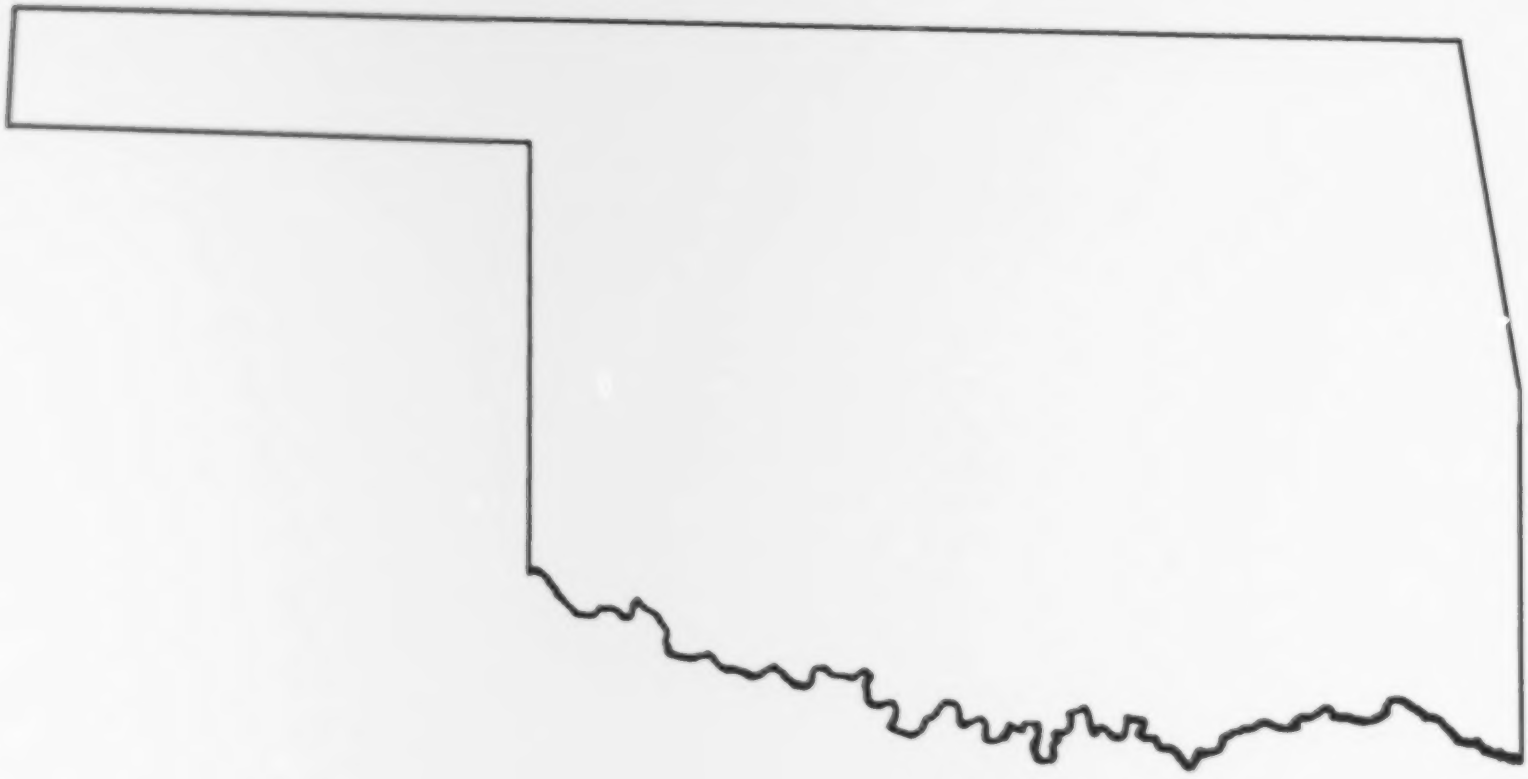
Ag in the Classroom

Oklahoma Map



Pattern 2

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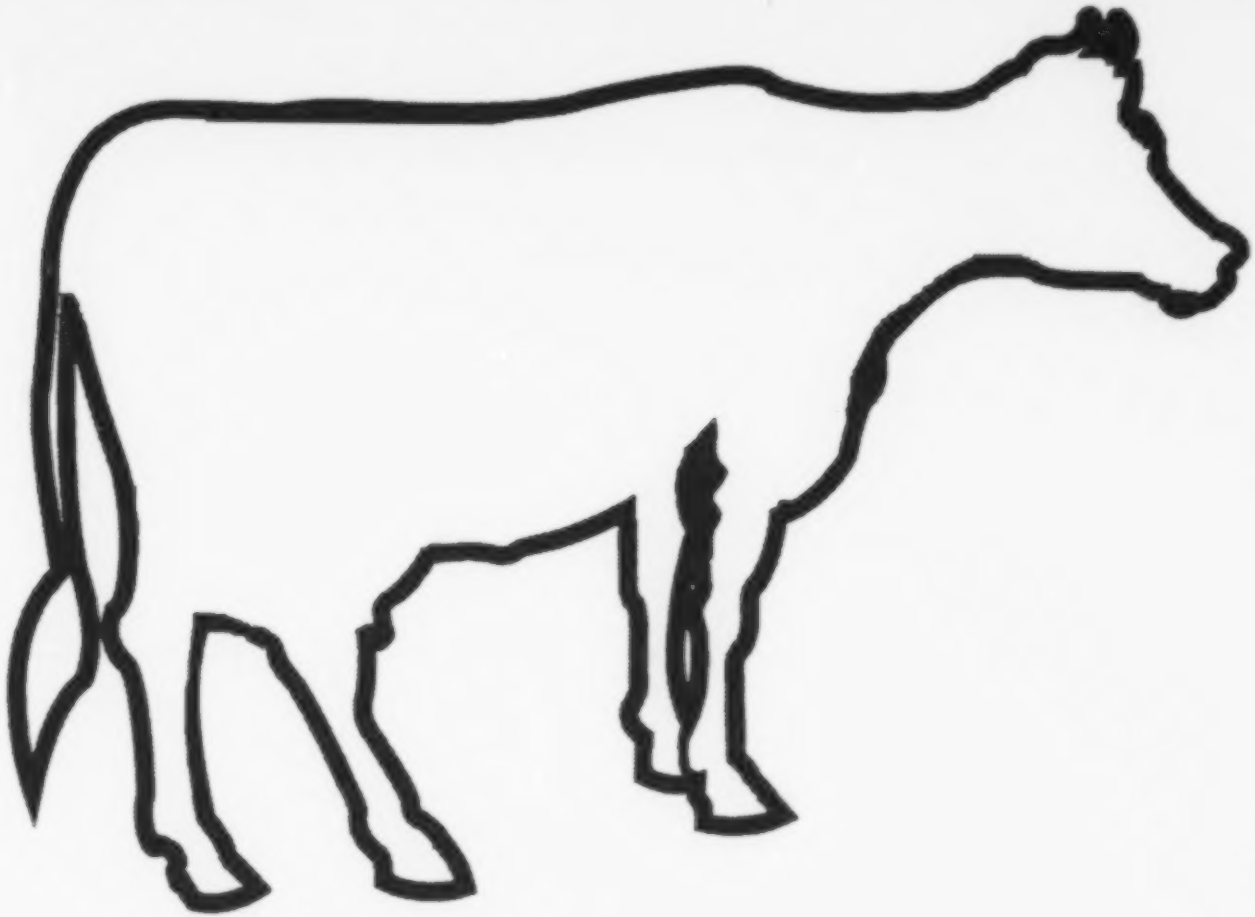
Cow



Pattern 3

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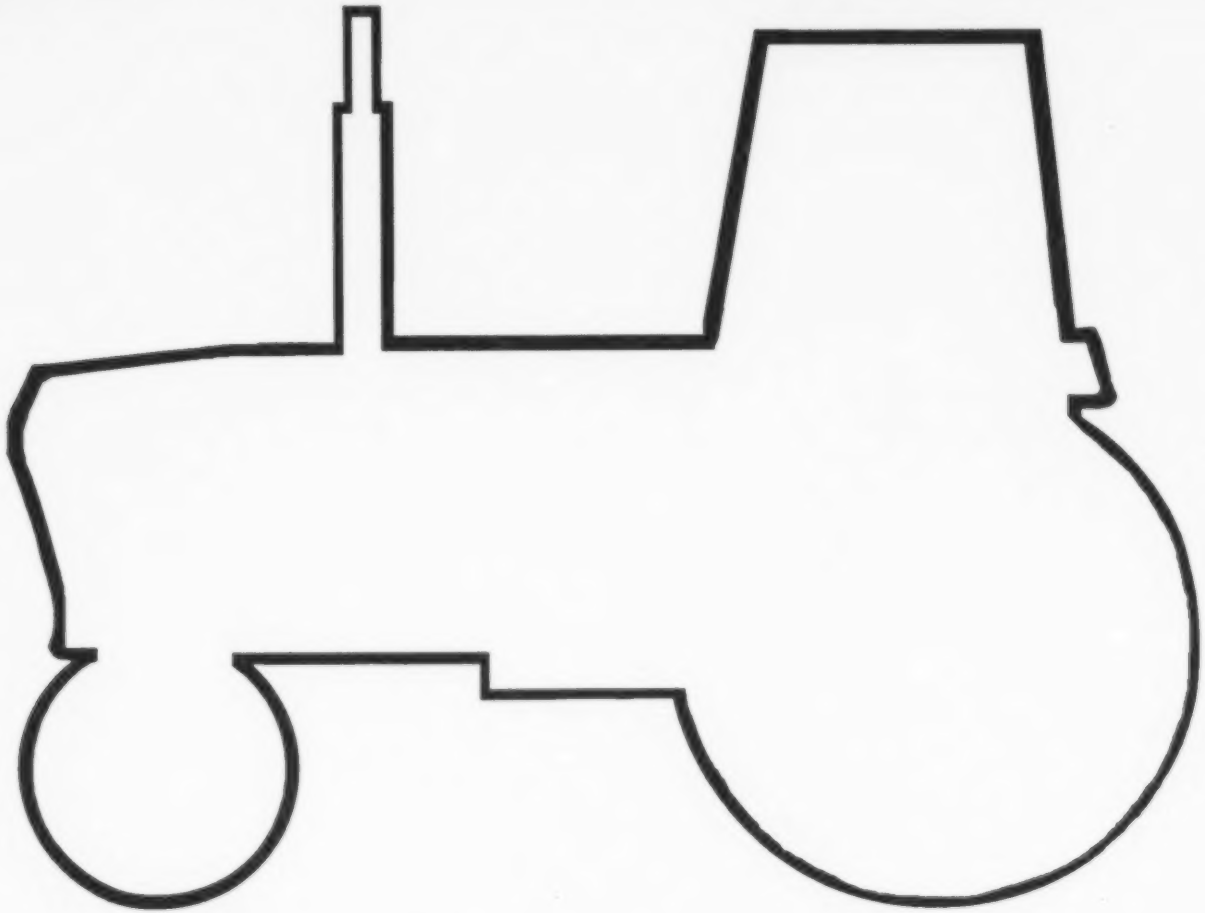
Tractor



Pattern 4

269

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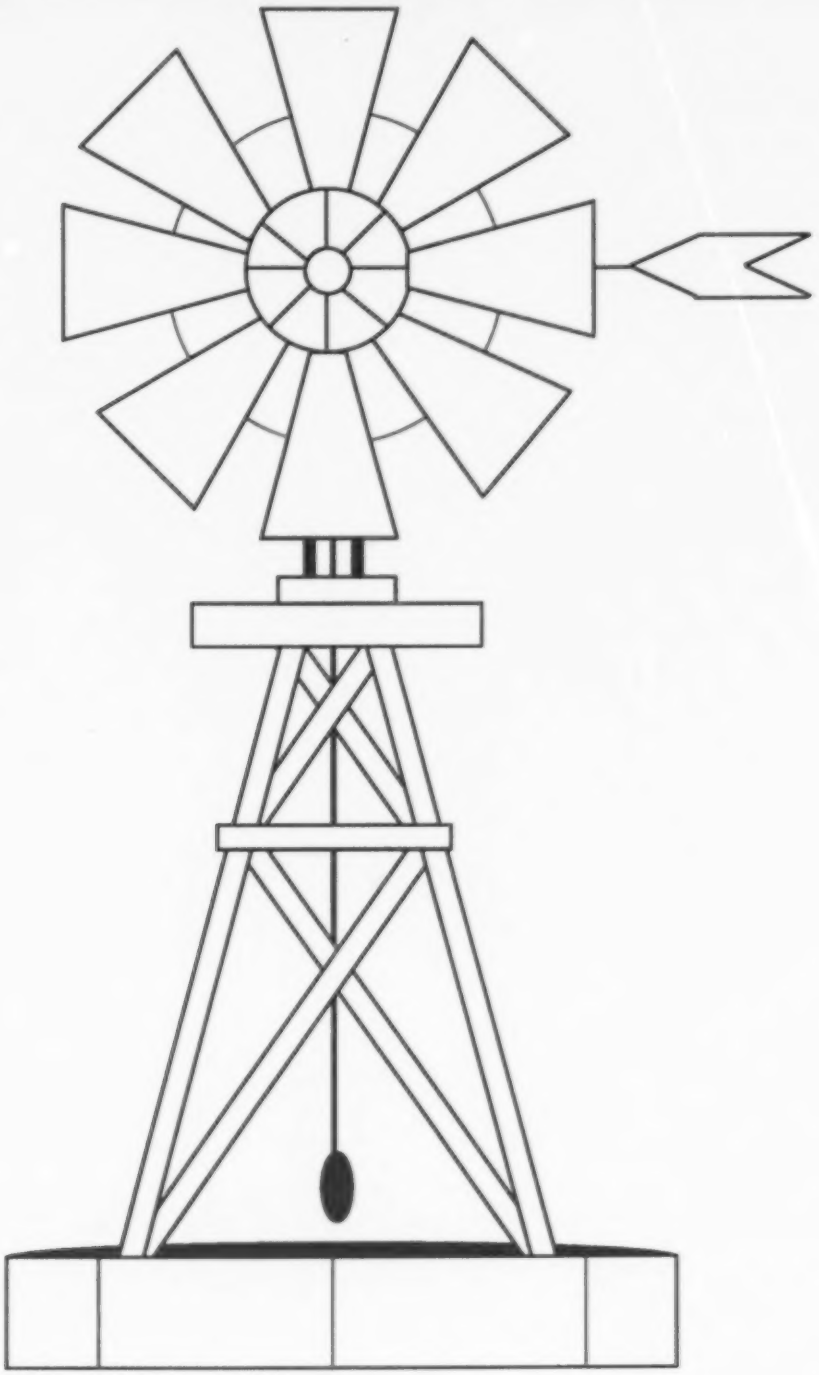
Ag in the Classroom

268

Windmill



Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Vegetables

broccoli

radish

carrot

potato

pumpkin

tomato

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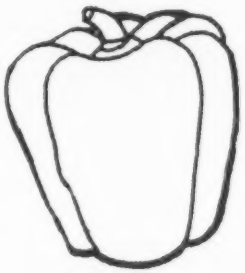
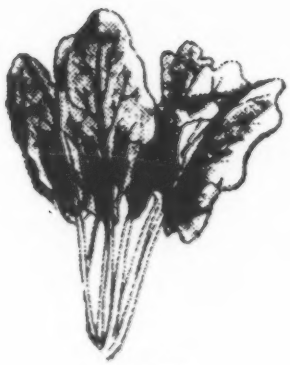
Vegetables

cantaloupe

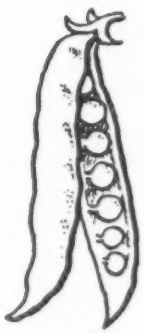
okra



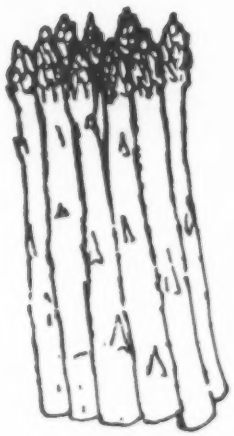
bell pepper



spinach



peas



asparagus

cucumber

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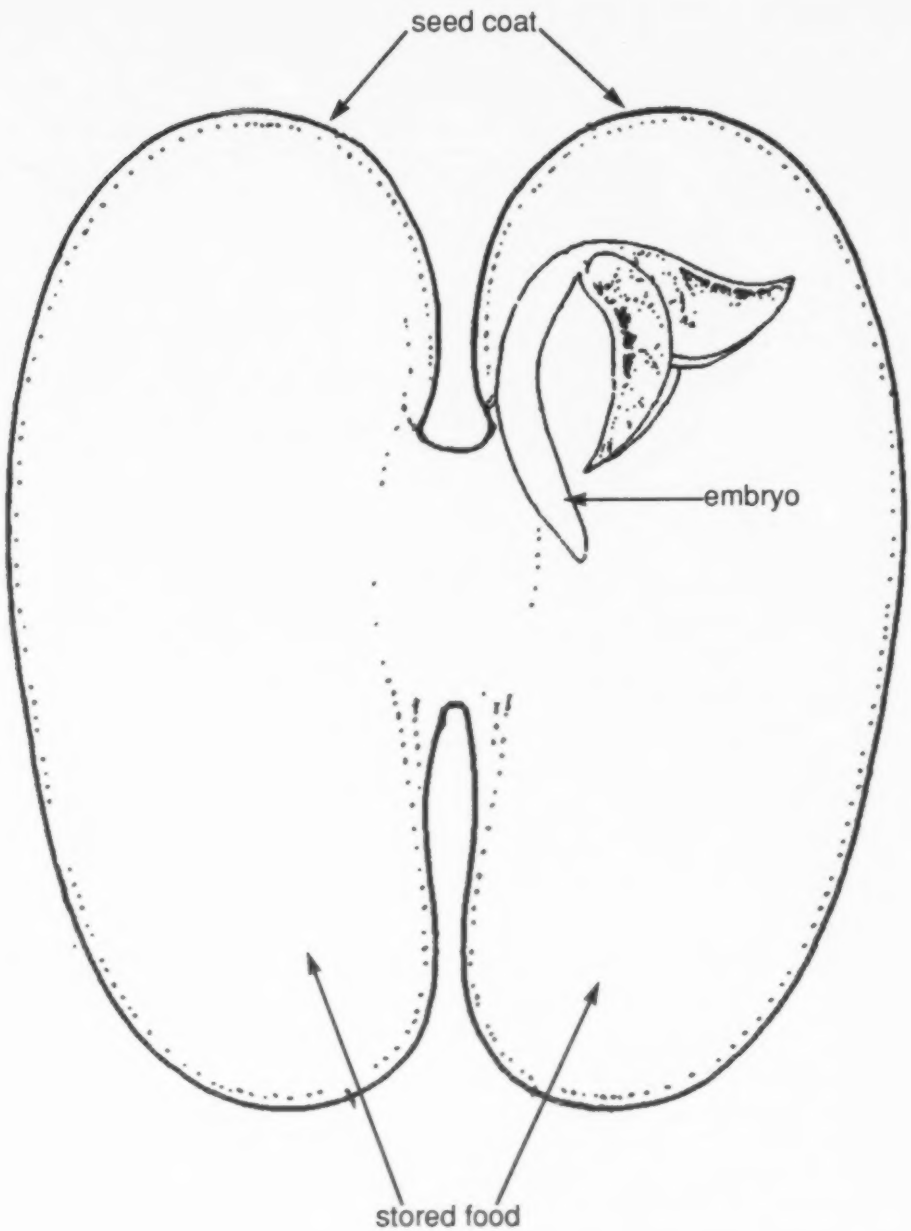
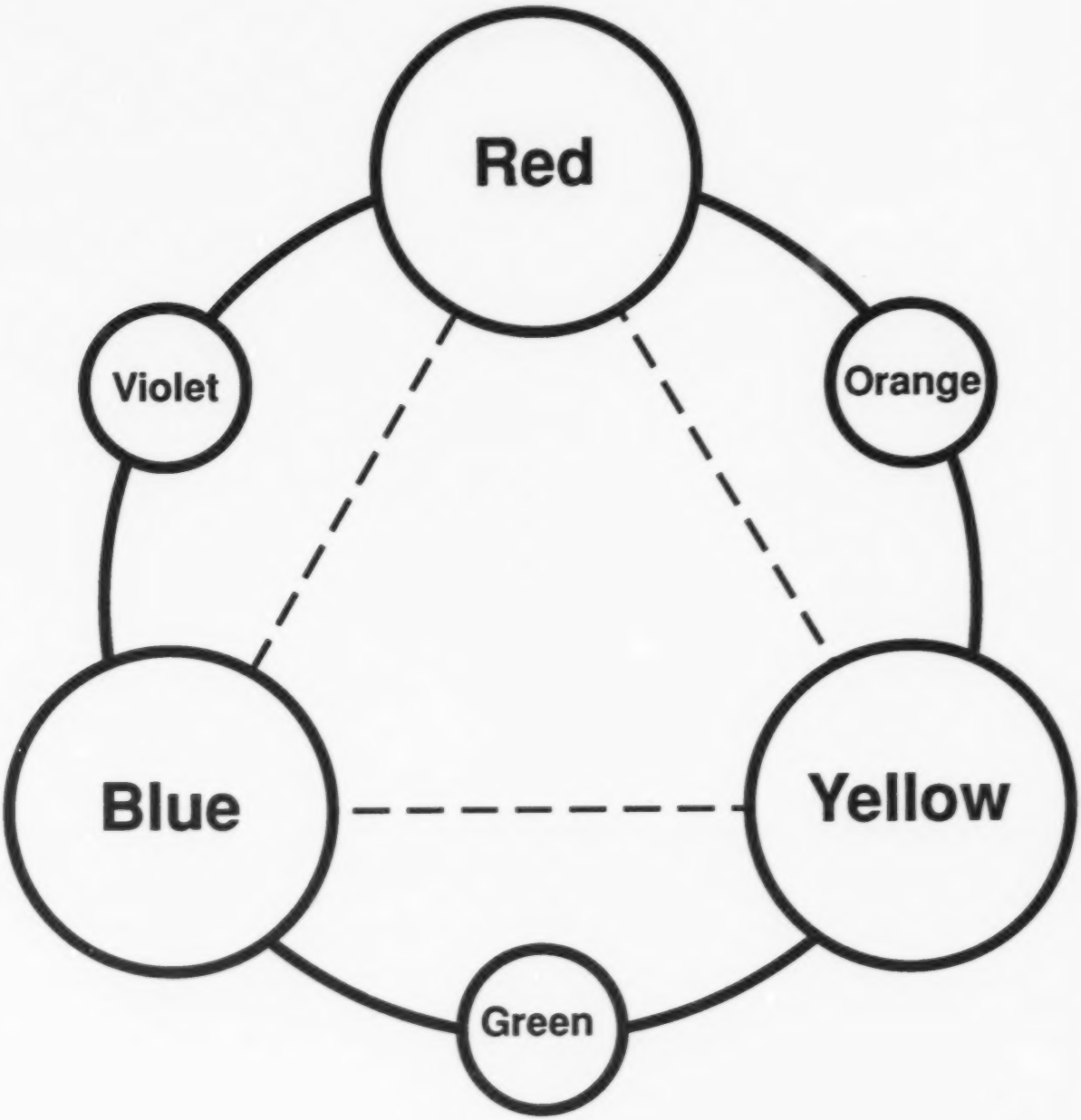
Pattern 272

The Parts of a Seed



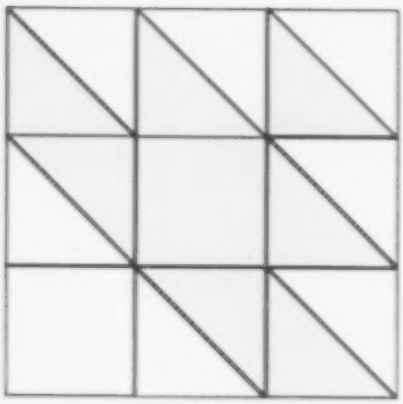
Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Color Wheel

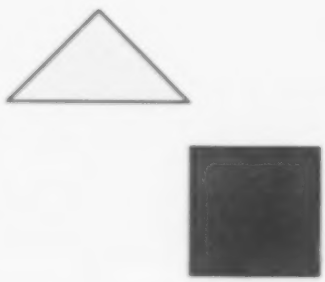


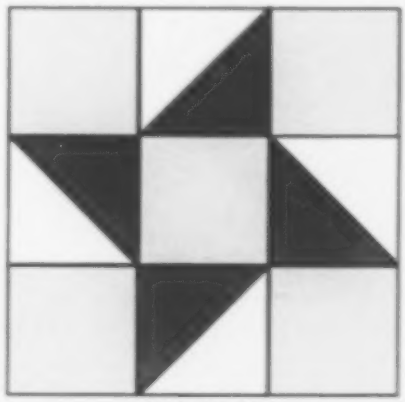
Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Quilt Patterns

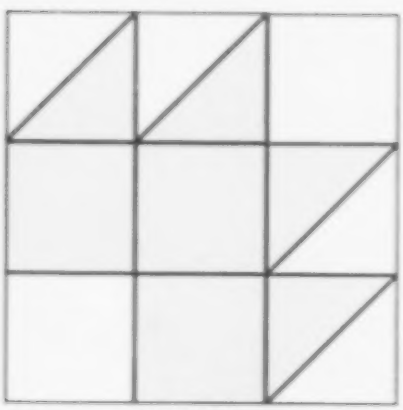


Sailboat



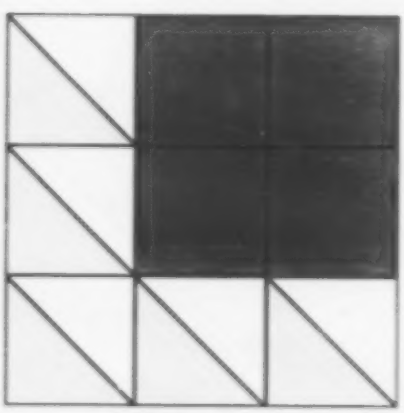


Windmill

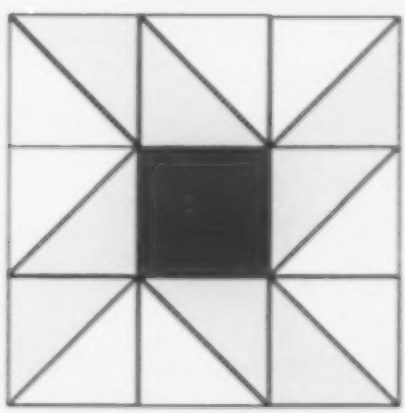


Mapleleaf

Star



Birds-in-the-Air



Formal Garden

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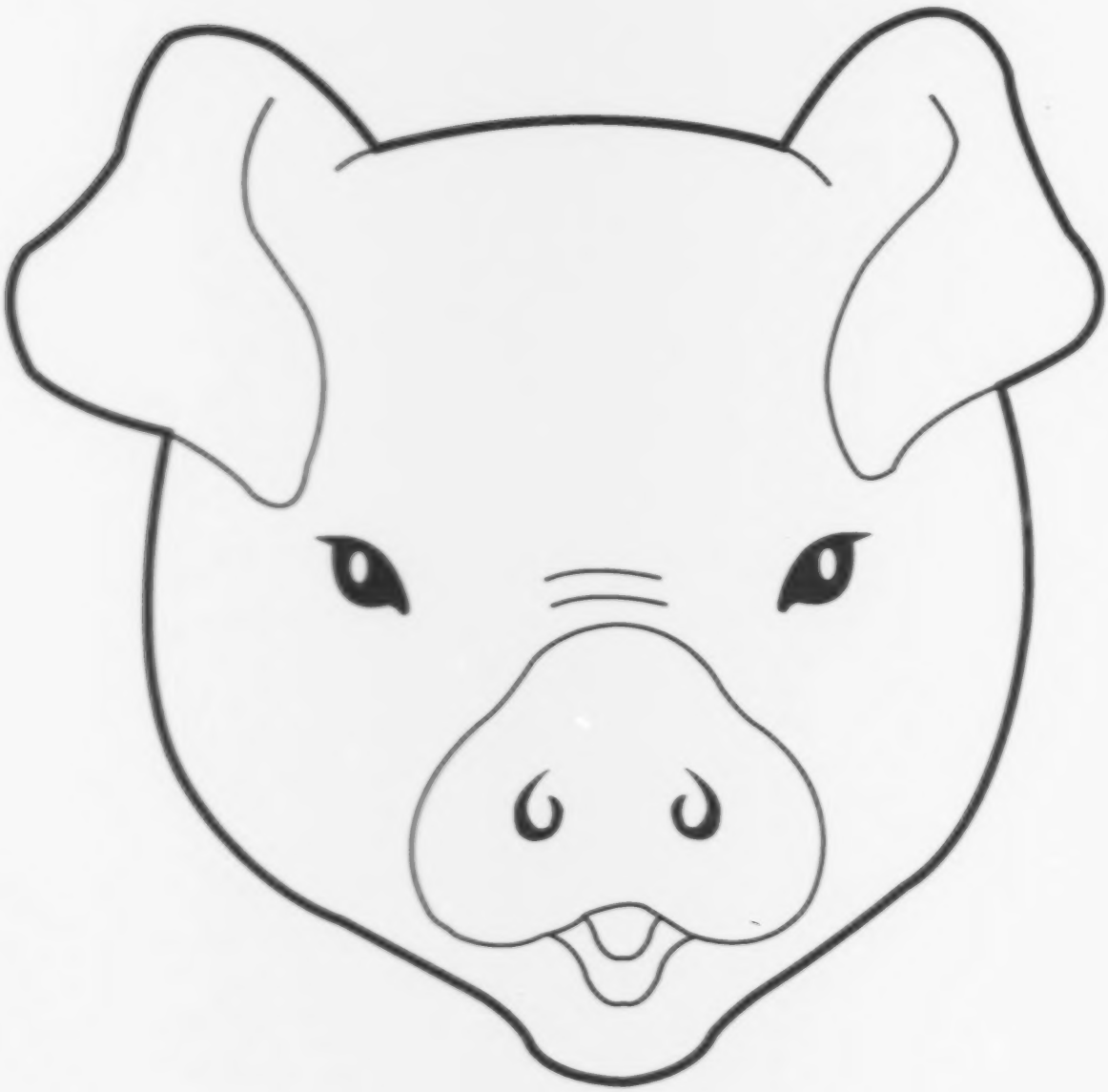
Horse Puppet

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Cow Puppet

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Pig Puppet



Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Lamb Puppet

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Life Cycle of a Pea

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

dragonfly

damselfly

ground beetle

praying mantis

lacewing

Beneficial Insects

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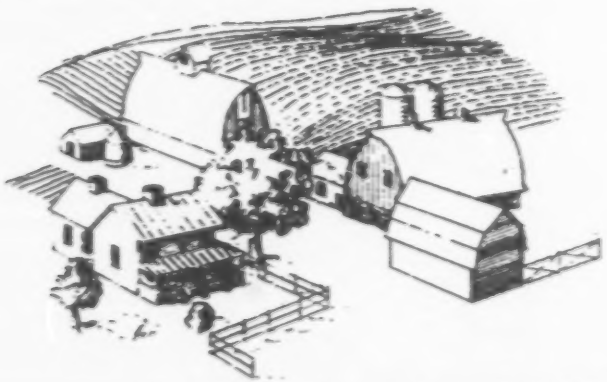

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Name _____

Oklahoma Writing Page

Oklahoma's
State Bird

scissor-tailed flycatcher

Oklahoma's
State Flower

mistletoe

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Name _____

Seeds Writing Page

maple

elm

redoak

pea

squash

sycamore

peanut

maple

corn

corn

elm

elm

redoak

redoak

oat

oat

pea

pea

pecan

pecan

wheat

wheat

squash

squash

maple

sycamore

oat

pecan

bean

peanut

corn

maple

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Name _____

Vegetable Writing Page

tomato

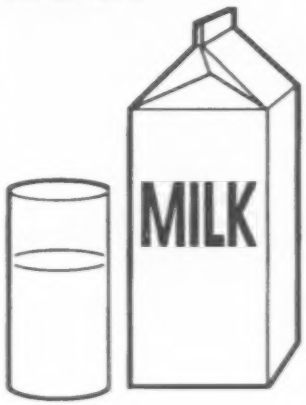
carrot

radishes

Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994

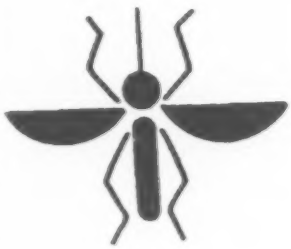
Bookmarks

"Pour" over



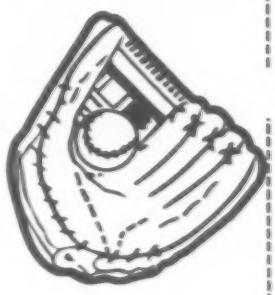
a good book.

Don't bug me!



I'm reading.

Catch



a good book.

"Chick" out

A GOOD BOOK.

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You did a cotton-pickin' good job.

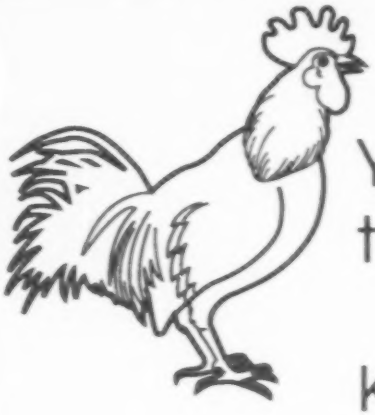
Keep up the good work!

teacher's signature

I'm *quackers* over your clean desk!

Thanks.

teacher's signature



Your work is something to crow about.

Keep pecking away!

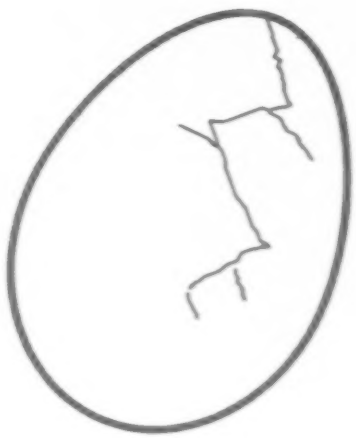
_____

teacher's signature

_____

student's name

You really crack me up with your hard work.



_____

teacher's signature

Name_____

Place Value Game Sheet

hundreds	tens	ones

Misc 4

239

239

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Name_____

Place Value Game Sheet

thousands	hundreds	tens	ones

Misc 5

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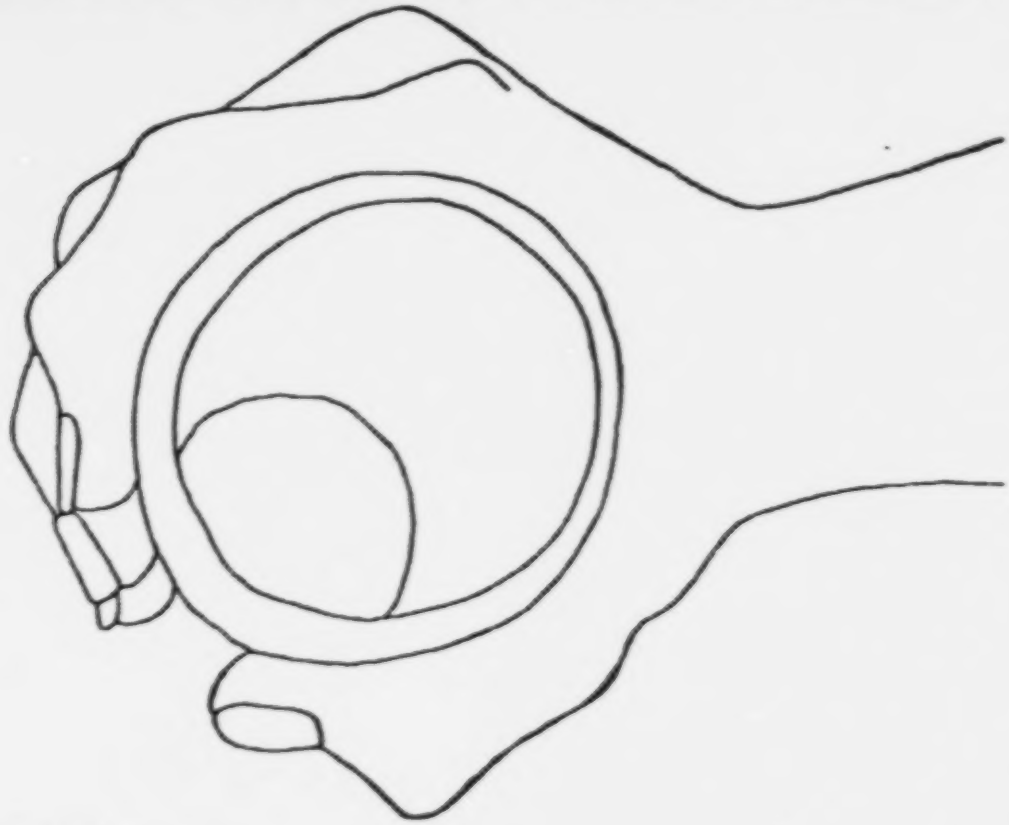
in cooperation with the Oklahoma Department of Agriculture, 1994.

Name _____

Take a Look



What are you observing? _____

_____

Make a list of some words that describe the object you are observing. _____

_____

State your hypothesis. _____

_____

What happened in this experiment? _____

_____

_____

On the back of this page, draw a picture of the experiment or the results of the experiment.

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Name _____

Observation Calendar

Monday	Tuesday	Wednesday	Thursday	Friday

Misc 7

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Name _____

Multiplication Grid

1	2	3	4	5	6	7	8	9
2								
3								
4								
5								
6								
7								
8								
9								

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Name _____

Multiplication Table

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
3	6	9	12	15	18	21	24	27
4	8	12	16	20	24	28	32	36
5	10	15	20	25	30	35	40	45
6	12	18	24	30	36	42	48	52
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81

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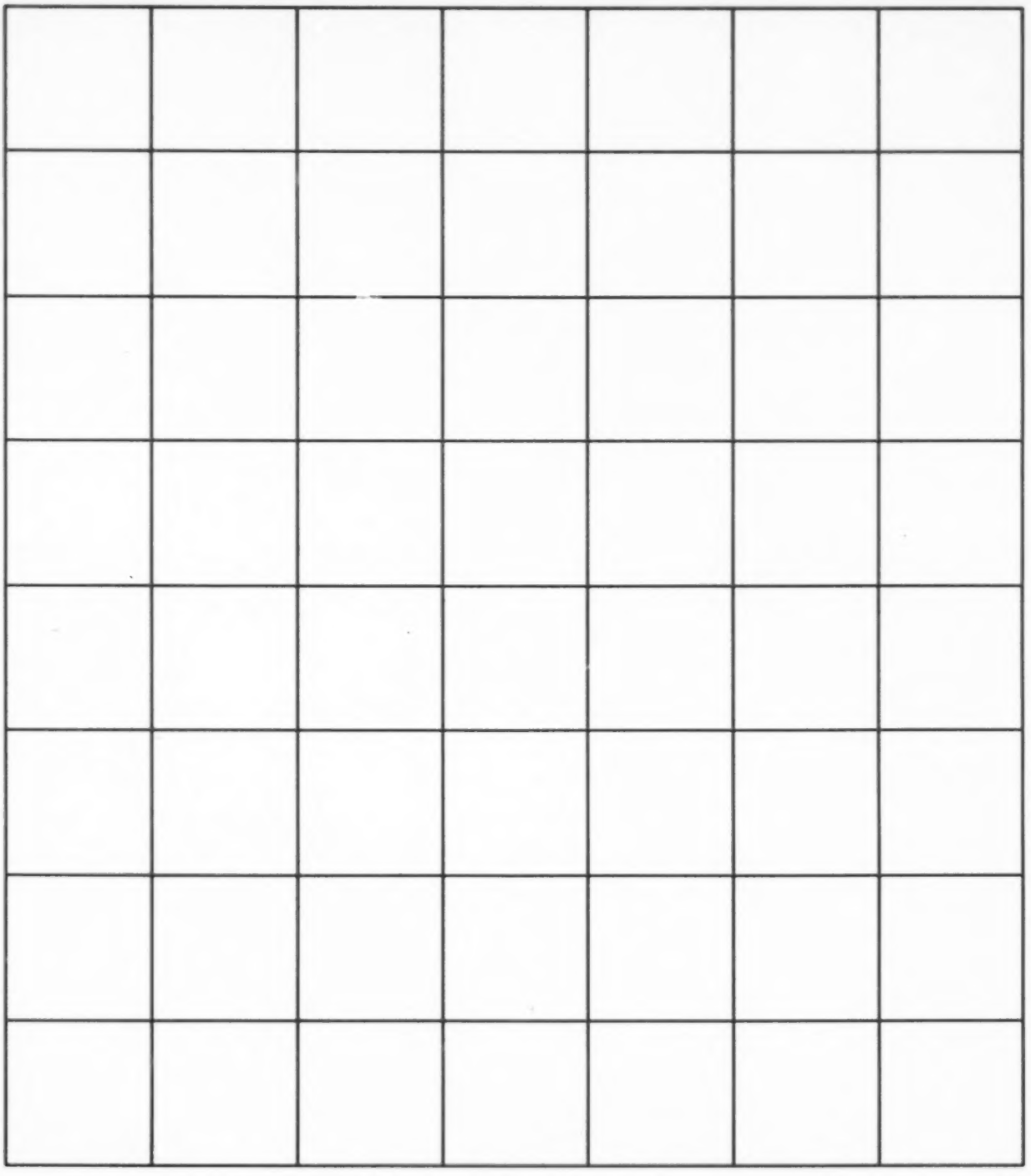
Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994.

Ag in the Classroom

Name _____

One-inch Grid



Produced by Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, OSU, in cooperation with the Oklahoma Department of Agriculture, 1994

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